# THE MODEL ENGINEER

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JUNE 10th 1954
Vol. 110 No. 2768


9D

# Draw on SKIPPER NAVY CUT

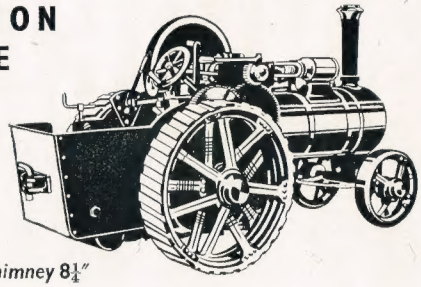
# FOR VALUE

PER **4/-** OZ.

IN AIRTIGHT TINS

*royds S1/3*

***Build this* WORKING BURRELL TYPE TRACTION ENGINE**



¾ INCH SCALE

*Length* 14¾″

*Width* 6⅛″

*Height at chimney* 8¼″

What could be more delightful to build than a Road Tractor ? Yet even enthusiasts hesitate to tackle this type of model because of the intricacies in design and casting, especially of the road wheels. This set of castings is planned to give all the pleasure of construction without the more tedious work. The road wheels are single castings and need only machining and filing.

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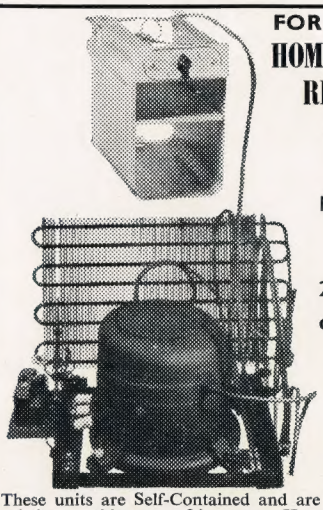

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SILENT RUNNING HERMETICALLY SEALED UNITS

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**BRAID BROS.**

*For Home Refrigeration Construction*

**50, Birchwood Avenue, Hackbridge, Surrey** Tel. Wallington 9309

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**This is a H.S. Milling Cutter Bargain.** All 1″ bore, 3″-3½″ dia., ½″-¾″ thick, including side and face cutters, plain and angle cutters. A most useful lot for any tool room, 6 ass. for 50/-. The present makers price of the cheapest cutter in this selection is 40s. You must get this lot, remember you get same on approval against cash.

**500 Toolmakers' Vee Blocks,** 1½″ square, 2″ long, precision machined and ground, one side large Vee opposite side small vee, complete with clamp. Worth 27/6 per pair. An essential tool for any engineers shop. Clear, 15/- per pair.

**300 H.S. Counterbore Drills,** 13/32″ dia. pilot drill, ⅞″ counterbore drill. No. 1 M.T. shank, 7/6 each.

**350 Interlocking Cutters,** side and face, 3″ dia., 1″ hole, ¾″ wide. Two separate cutters, bargain 30/- pair. Actual value £5.

**2,000 Small H.S. Twist Drills,** approx. 1/32″-3/32″, 4/- doz. approx.; 1/16″-¼″, 7/6 per doz. approx.; 9/32″-15/32″ six for 10/-.

**250 No. 1 and 2 M.T. Shank Twist Drills,** slightly used, but re-ground as good as new, 27/64″-1 13/16″. Very handy lot. Six ass., 27/6.

All items brand new. £1 orders post paid. Prompt delivery. Inspection by appointment only. All items sent on approval against cheque or P.O. Refund without question if any item returned.

**2,000 H.S. Side and Face Cutters,** 1″ hole 2¼″ dia., ¼″ thick, 15/-; ⅜″ thick 17/6; ½″ thick 20/-. 3″ dia., ¼″ thick 17/6; 5/16″ thick 20/-; ⅜″ thick 22/6; ½″ thick 25/-; ⅝″ thick 27/6. 3½″ dia., ¼″ thick 20/-; 5/16″ thick 22/6; ⅜″ thick 25/-. 5″ dia., ¾″ thick 55/-; 1″ thick 65/-.

**5,000 H.S. Morse Taper Shank End Mills,** spiral teeth. No. 1 shank ¼″ dia. 6/6, 5/16″ dia. 7/6, ⅜″ dia. 7/6, ½″ dia. 8/6. No. 2 shank ⅜″ dia. 10/6, ½″ dia. 12/6, 11/16″ dia. 12/6, ⅝ dia. 14/-, ¾″ dia. 15/-. No. 3 shank 1⅛″ dia. 22/6. No. 4 shank 1⅜″ dia. 25/-, 1½″ 27/6, 1¾″ 35/-, 1⅞″ 40/-. No. 5 shank 2″ dia. 50/- each.

**3,000 Circular Split Dies** 1″ dia. cutting ¼″, 5/16″, ⅜″, 7/16″, ½″ Whit., B.S.F., also brass thread, 26 thread all sizes and American N.F. 12/- per set of 5 sizes, 2 sets 22/6, 4 sets 42/6. Taps to suit 9/3 per set, either taper or second or plug. 1″ die-stocks 5/- each; 3/16″ to ½″ tap wrenches 12/6 each.

**2,000 H.S. Long Twist Drills** all straight shank 1/16″ to 3/16″ dia. 4″ to 6″ long, 5 assorted, 10/-. Would cost much more than treble this price.

**500 H.S. No. 1 M.T.S. Twist Drills,** ¼″ to ½″ dia., 3 ass. 10/6, our selection; 6 for £1.

**1,000 Hand Reamers,** ¼″, 5/16″ and ⅜″, 8/6 per set of three; 3/6 each.

**1,000 High Speed Inserted Blades Expanding Reamers,** 17/32″ to 19/32″ 14/-, ⅝″ to ⅞″ 16/-, 11/16″ to ¾″ 17/6, ¾″ to 27/32″ 17/6, ⅞″ to 31/32″ 18/6, 31/32″ to 1½″ 22/6 each.

**100 H.S. Concave Cutters,** dia. of circle 5/16″ or ⅜″, cutter dia. 2½″ hole 1″, 12/6 each.

**1,000 High Speed Parting Off Tool Blades,** Eclipse brand: ½″ × 3/32″ × 4½″ long, 4/- each; 11/16″ × 3/32″ × 5″ long, 5/- each; 13/16″ × 1/16″ × 6″ long, 5/- each; 15/16″ × 3/32″ × 6″ long, 6/- each.

**7,000 Pratt & Whitney,** circular split dies, superior quality precision ground cutting edges, 13/16″ dia., suitable for machine or hand use. Sizes: 2, 4, 5, 6 B.A., 8/6 per set.

**1,000 Extra Long Twist Drills,** straight shank, H.S. and carbon, 3/16″ to 5/16″ dia., 6″ to 8″ long, six assorted 15/-.

**5,000 Ball Races,** ⅛″ bore, ⅜″ o.d., ⅛″ thick, 4/- pair; ¼″ bore, ⅜″ o.d., 7/32″ thick, 4/- pair; 6 mm. bore, 19 mm. o.d., 6 mm. thick, 4/- pair. 12 mm. bore, approximately ½″, 35 mm. o.d., 9 mm. thick, 4/- pair; 9 mm. bore, 26 mm. o.d., 8 mm. thick, 4/- pair; ⅜″ bore, ⅞″ o.d., 7/32″ thick, 5/- pair.

**4/9 Any LOT.** Five lots 22/6. 2 H.S. Tap or Reamer Fluting Cutters 1¼″ dia., ⅜″ hole, ¼″ and 3/16″ thick, worth 7/6 each. Set 5/32″, 3/16″, 7/32″, ¼″, all in 40 thread, 13/64″ Split Dies: 8 assorted Centre Nail Pin and Belt Punches, total value 12/6; one H.S. Tap or Reamer Fluting Cutter, 2¼″ dia., ⅜″ thick, ⅞″ hole; one ⅜″ H.S. Hand Reamer, worth 10/-. Every item a good bargain.

**500 Sets Metal Figure Punches,** nine punches 0 to 8, the six is used reverse for nine; size 5/64″ 6/6 set, worth 15/-; ditto 1/8″ size, 8/6.

**3,000 High Speed Tool Bits,** ⅜″ square, 3″ long, hardened ready for use, 12/6 doz., 3 doz. 35/-. Ditto 5/16″ round, 3″ long, 8/6 per doz.

**2,000 Files,** 4″ to 6″ flats, half-rounds, rounds, squares, warding assorted, cuts, good general lot, 10/6 doz.; three doz. 28/6.

**600 Circular Split Dies,** B.T.D. make ¼″ dia., ⅜″, ½″, ⅞″, 1″ Whit. ⅜″ Gas; worth 11/- each. Clear 7/6 each, new 2¼″ die-stock to suit, worth 30/- each, clear 10/- each.

**200 Boxes A to Z Steel Letter Stamps** for marking metal, 5/64″ size, 17/6 set; ditto ⅛″ size, 22/6 set, worth treble this price.

**2,000 Straight Shank End Mills,** size ⅛″, 5/32″, 3/16″, 7/32″, ¼″, 5/16″, list price 30/- set, handy bargains, 15/- set, also ⅜″, 7/16″, ½″ ditto 12/6 set, all in makers' wrappings.

**500 H.S. 90° Countersinks,** body ½″ dia., teeth cut to point. An essential tool for any workshop using c/s screws. Gift 5/- each.

**1,000 Bevelled Wood Chisels,** handled, ¼″, 5/16″, ⅜″, ½″, ⅝″, ¾″, ⅞″, 1″. Actual value 32/6. Gift 21/- set.

**2,000 Rotary Files,** 3/32″ shank, various shapes. Six for 6/6, 12, 12/-. Very handy.

**3,000 High Speed Routing Cutters,** straight shank, two lip, as used for cutting slots in wood, sizes ⅜″, ½″ dia., clear 4/- each.

**1,000 Toolmakers' Needle Files,** good assortment of shapes and cuts, worth 1/9 to 2/6 each, 12/6 doz.

**200 Ace Dial Gauges.** 2½″ face, reads to 0.001″, plus and minus, very useful instrument, worth 60/-, gift 45/-.

**300 High Speed Straight Shank End Mills,** ⅞″ dia., 10/- each.

**20,000 High Speed Milling Cutters.** Counterbores and Countersinks, Radius and Angle Cutters, ⅜″-1¼″ dia., 10 assorted 25/-. Actual value 5/- to 15/- each.

**10,000 High Speed End Mills Straight Shank,** 3/32″ to 3/16″ dia., some with teeth cutting both ends but not standard sizes, clear 5 assorted, 10/-.

**200 Cast Steel Circular Saws for Wood,** 4″ dia., 6/- each; 6″ 10/-; 8″, 13/6; 10″, 18/-; 12″, 24/-. Larger sizes. Prices on application.

**50,000 Brass B.A. Screws,** 2, 4, 6, 8 B.A. Various type heads most useful stock. 2 gross ass. 4/9.

**100 doz. 6″ Three square Saw Files,** 10/6 per dozen.

**1,000 Carborundum Grinding Wheels,** fine and medium coarse, useful pair for tool grinding 6½″ dia., ½″ thick, 1″ hole, 7/9 per pair. Easily bushed to suit your spindle. Actually worth more than double. Also 5″ dia. cup wheels ⅛″ hole medium coarse, 4/9 each. Also 6½″ dia. ½″ thick, ¾″ hole, 4/9 each.

**1,000 H.S. Taper Pin Reamers,** 7/32″ size, 5/- each, also Nos. 5, 6, 7, 8, 9, 10, 5/- each. 30/- set of 7.

**500 H.S. Angle Cutters** as used for milling teeth in slitting saws and milling cutters. Actual value £3 each. 2½″ dia., 1″ hole. Clear 25/- each.

**400 H.S. Milling Cutters and Angle Cutters,** 1½″-2″ dia., ⅜″ hole, 4 ass. 22/6. Useful bargain.

**100 H.S. Slotting Cutters,** 5″ dia., 3/16″ thick, 1″ hole, 12/6 each.

**200 H.S. Slitting Saws,** 8″ dia., 3/32″ thick, 1″ hole, 20s. each. Also 5″ dia., 1/32″ to 3/32″ thick, ½″, ⅜″ and ¾″ holes, 6s. each. 3 for 15s.

**1,000 "Leytool" Ratchet Spanners,** 3/16″, ¼″, 5/16″, ⅜″, 7/16″, ½″ Whit. Makers' price 70/- per set. Very useful bargain, 35/- per set.

**100 H.S. No. 1 M.T. Shank Reamers,** 7/16″ dia., 7/6 each.

**1,000 Semi High Speed Centre Drills,** Slocombe brand, 5/16″ body diam., 3/32″ points, 1/6 each, 16/6 per doz.

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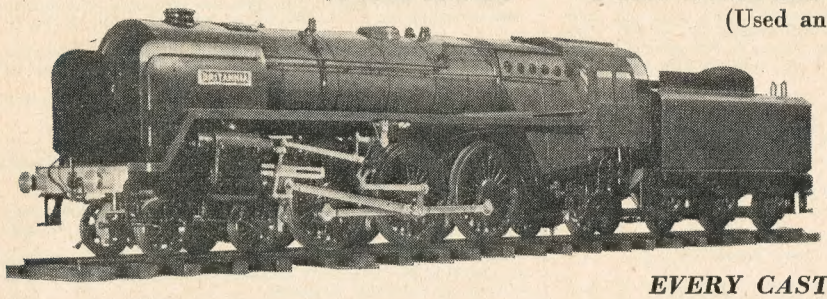

"BRITANNIA" in 3½" G. built by Mr. A. W. Major, Chadwell Heath, Essex, to L.B.S.C.'s instructions and using castings supplied by "WILWAU."

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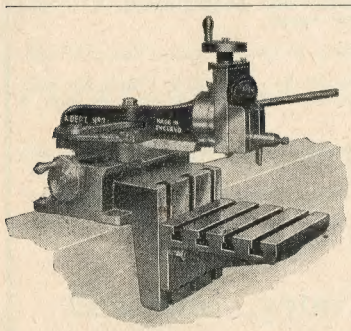

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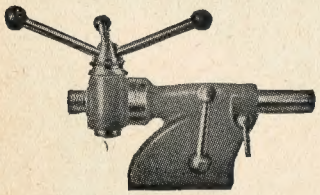

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**£5 5 0**

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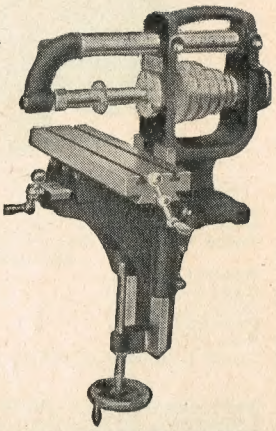

*AN ESSENTIAL FOR THE M.E.*

★ **STURDY** 100-lb. weight

★ **WIDE CAPACITY** Table 14 in. x 3¾ in. Vertical Traverse 7½ in.

★ **ACCURATE** Precision Ground Spindle and Table

**VEE BELT DRIVE MACHINE**

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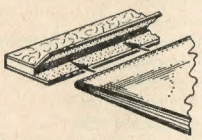

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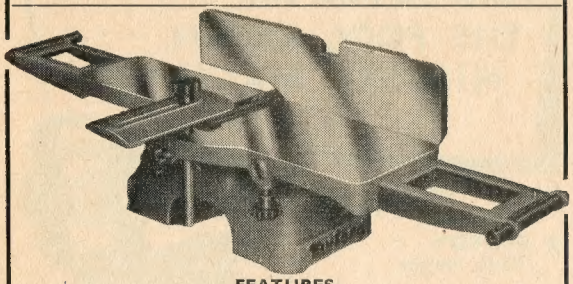
## THE MYFORD "PRII" BENCH PLANER



**FEATURES**

Three blades giving 12,000 cuts per min.—Timken roller bearings, sealed and pressure lubricated—rotor mounted on steel spigots—blades on chip breaker blocks with screw jacks—fence tilting 45 degrees either way—fully guarded.

**SPECIFICATION**

| | |
|---|---|
| Width of cut | 4½" |
| Depth of cut | ⅛" |
| Rebate Depth | ½" |
| Front Table | 10⅝" x 7⅝" |
| Rear Table | 10⅝" x 4¾" |
| Overall Dimensions (with Extension Rollers, as illustrated): | Length 38" Width 17" Height 10" |

**PRICE LIST**

**Code-9403.** 4½" Bench Planer with Extensions and Motor Pulley (LESS MOTOR) **£20 7s. 6d. or £5 7s. 6d. DEPOSIT and £1 10s. 0d. MONTHLY. Code 9403/M.** As 9403 but complete with ½ h.p. Motor. **£28 19s. 0d. or £7 19s. 0d. DEPOSIT and £2 2s. 0d. MONTHLY.**
**Code 1498.** Set (3) Spare Cutter Blades. **£1 7s. 6d.**

*Illustrated leaflet gladly on request.*

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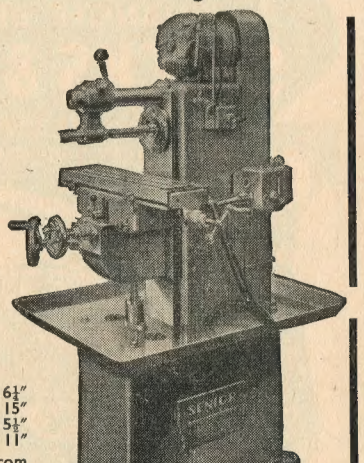
This is a Precision Miller, built to fine limits. In addition to the high grade craftsmanship special care is taken in the painting work. All castings are carefully filled, and rubbed down before the final oil resisting paint is applied. Hand wheels, levers, etc., are bright chromium plated, resulting in a superbly finished machine. Micrometer Collars have matt finish with black waxed markings for easy non-dazzle reading.



**MODEL M.1**

| | |
|---|---|
| Table | 25" x 6½" |
| Table travel | 15" |
| Cross feed | 5½" |
| Vertical feed | 11" |

12 Spindle speeds . . . from 50 to 1,660 r.p.m.

Full range of accessories can be offered

**TOM SENIOR**
**LIVERSEDGE, YORKS., ENGLAND**

TELEPHONE Cleckheaton 547
TELEGRAMS: Senior, Cleckheaton 547

*If further interested write for Brochure fully describing the machine with its range of attachments*

## *Miniature bearings*

*TO ALL SIZES AND SPECIFICATIONS*

## For people who *KNOW* castings

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|---|---|---|---|---|
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| Main Horns, castings | — | — | 27/- | set |
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| Drivers, 14 spokes, correct balance weights | 12/- | 20/- | — | set |
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THE MODEL ENGINEER

EVERY THURSDAY

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### Our Cover Picture

Of the very many British express passenger locomotives of the 1890-1900 period which stir the enthusiasm of the modern generation, the beautiful and celebrated 7 ft. 8 in. singlewheelers designed by William Dean for the old Great Western Railway are in the front rank. We know of two well nigh perfect examples in course of construction for 3½-in. gauge ; one, by Mr. D. G. Webster, of Maidenhead, has already been mentioned in our pages, while the other, by Mr. J. H. Balleny of Birmingham, is here mentioned for the first time. Both builders are working from official drawings, and both are determined that their work shall result in as near perfect a model as circumstances will allow. Our cover picture shows Mr. Balleny at work on his model, examining the rear end for squareness; the carefulness expressed by his attitude is typical of him.

# SMOKE RINGS

### "The Editor Regrets—"

THERE ARE occasions when we find it necessary to remind our readers of the truism that editors are busy people, and that they are subject to the human limitation of inability to be in several places at once. Of the numerous invitations which we receive from clubs and individual readers, to attend functions which are undoubtedly of the highest importance to the parties concerned, it is clear that we can accept only a few. In cases where we are obliged to decline, we trust that readers will absolve us of any suspicion either of favouritism or discourtesy; we assure them that we are keenly interested in everything that goes on in the model engineering world, whether it is in Perth or Penzance, and absence does not signify indifference.

### Lower-quadrant Signals Again

AT AYLESBURY, London Transport station, considerable alterations are being made to the signalling equipment. The old mechanical signals, points, crossovers, etc., are being replaced by power-operated apparatus ; but the really surprising thing to note is that the new signals are not the expected colour-lights, but *lower*-quadrant semaphores. About 40 years ago, the old Metropolitan Railway introduced the 2-position upper-quadrant signal, for the first time on a British railway, and adopted it as standard, at least for all above-ground sections in the London area; these, of course, were power-operated. In the underground sections, 2-aspect colour-lights, most of which were automatic, were adopted. Later, these were extended to the above-ground sections, and largely replaced the semaphores within the electrified area of the system.

In the country districts, however, the old mechanically-operated semaphores were retained, all of lower-quadrant type ; and this is the type now being superseded by power-operated semaphores. It would be interesting to know just what has led to the retention of the lower-quadrant type of signal, in equipment which, in all other respects, appears to be of the most modern nature. We should not have been so surprised at the use of upper-quadrant semaphores instead of colour-lights, for the latter have certain disadvantages, when compared with semaphore signals, though of a minor kind; but *lower*-quadrants reintroduced 40 years after their abandonment are very intriguing, to say the least.

### "Ars Longa, vita Brevis"

WE OFTEN hear of promising model engineering enterprises which are cut short by the death of the constructor, and it is much to be deplored that such works should be fated to remain for ever unfinished. The same conditions often arise in the case of art and literature, and attempts are made, with varying success, to finish work so nobly begun. Model engineering work also is sometimes passed on to a successor, but we know of comparatively few cases where the results have come up to the original conception of the originator. However, it is perhaps better that they should be finished even imperfectly than not at all.

We are reminded of this by a recent appeal from a widow in North Wales whose late husband was an enthusiastic constructor of clocks, including electric battery-driven types, and has left unfinished a long-case clock of his own design. So far we have not been able to refer her to anyone within our personal acquaintance who would be interested in finishing his work, but if any of our readers are prepared to help in this respect, we shall be pleased to pass on any correspondence addressed care of this office, and headed "A.R."

# Testing small I.C. Engines

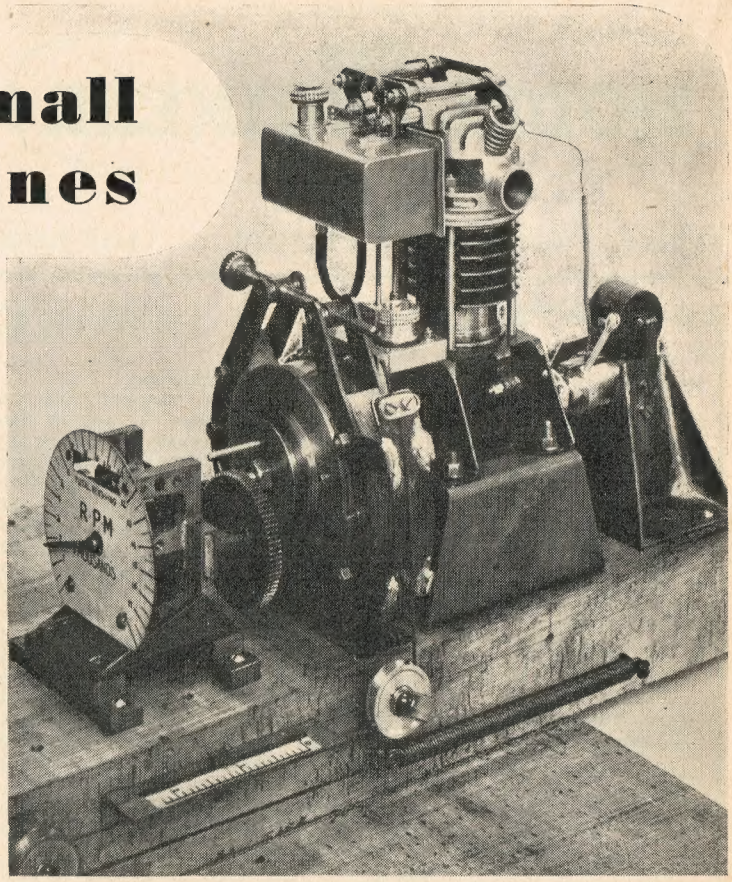
## By P. G. F. Chinn

IN performance-testing a miniature i.c. engine, there are three factors upon which the results primarily depend.

First, there is the design of the test equipment—notably the brake or dynamometer upon which the unit is intended to record torque or, in some cases, brake-horsepower.

Secondly, there is the tester himself. The technique of performance-testing takes time to acquire and a common sense approach. As with so many things, there is no substitute for experience. The writer has been conducting dynamometer tests on model engines continuously for the past six years, and over one hundred different types of engines have been dealt with. Much has been learned, and a great deal of data has been sifted from the combined results, both in connection with the actual process of testing and in regard to miniature engines in general.

Thirdly, there is the test engine itself. If this is one of a type in series production, the importance of accurate interpretation of results so as to be comparable with the average performance and characteristics of the type, has to be considered if such results are to be made public and are to be of practical value. Model engines, even more so than full-size types, have individual differences which may have considerable bearing on the performance realised. Unless one has sufficient knowledge to be able to detect variations, the rated performance, or handling characteristics with which the type is subsequently credited, may not truly reflect the actual qualities of an average production unit. In the case of a " one-off " special, this is no less important if one is to extract the best possible performance from a given design specification. Thus, while no duplicate units are available for comparative tests in such a case, one can, by means of intelligent analysis of test results, determine whether the engine is up to standard or not, and whether improvement may be expected without major modifications.




*A good example of a band-brake dynamometer coupled to a 15 c.c. power-boat engine, by R. E. Mitchell of Runcorn*

It would be true to say, therefore, that the mere test gear used is certainly not the be-all and end-all of engine testing. This situation also applies to full-scale testing and is aptly and amusingly summed up by Sir Harry Ricardo in his Foreword to Young and Pryer's " Testing of I.C. Engines " in which he says: " The testing of i.c. engines is by no means the simple problem it appears, despite the vast improvements in testing equipment which have been attained in the last few years. Elaborate equipment is not only costly, it requires a great deal of experience and skill in handling, but with intelligence and careful guidance much good work can be done with very crude apparatus. . . . An engine may be regarded as a creature of infinite and dogged cussedness, but entirely lacking in sense of humour—a very fit subject for the practical joke, and the art of testing consists really in keeping our patience and inventing new practical jokes to play upon it; secure in the knowledge that we can fool it all the time. . . . If all will study this book . . . there will be far fewer examples of the engine having fooled the tester, a state of affairs far too common today. . . ."

The subject of i.c. engine testing—even miniature i.c. engines—is, of course, far too big to be fully dealt with in one short article, but, having put the problem in its right perspective by mentioning the significant side issues involved, we will now deal with the actual equipment needed.

Two main instruments are required for the determination of performance curves; a dynamometer or brake, and a revolution counter or tachometer. These give us, respectively, the torque developed by the engine, and its speed in revolutions per minute under any fixed load and, when

multiplied together in the appropriate mathematical relation, will give us the brake horsepower. There is a type of brake, the electrical generation dynamometer, which is capable of giving a direct and instantaneous reading in b.h.p., but this depends solely on the conversion of engine power into electrical energy, which is then measured by means of a meter calibrated in horsepower, and is generally used only for checking production engines and is not considered accurate enough for prototype testing.

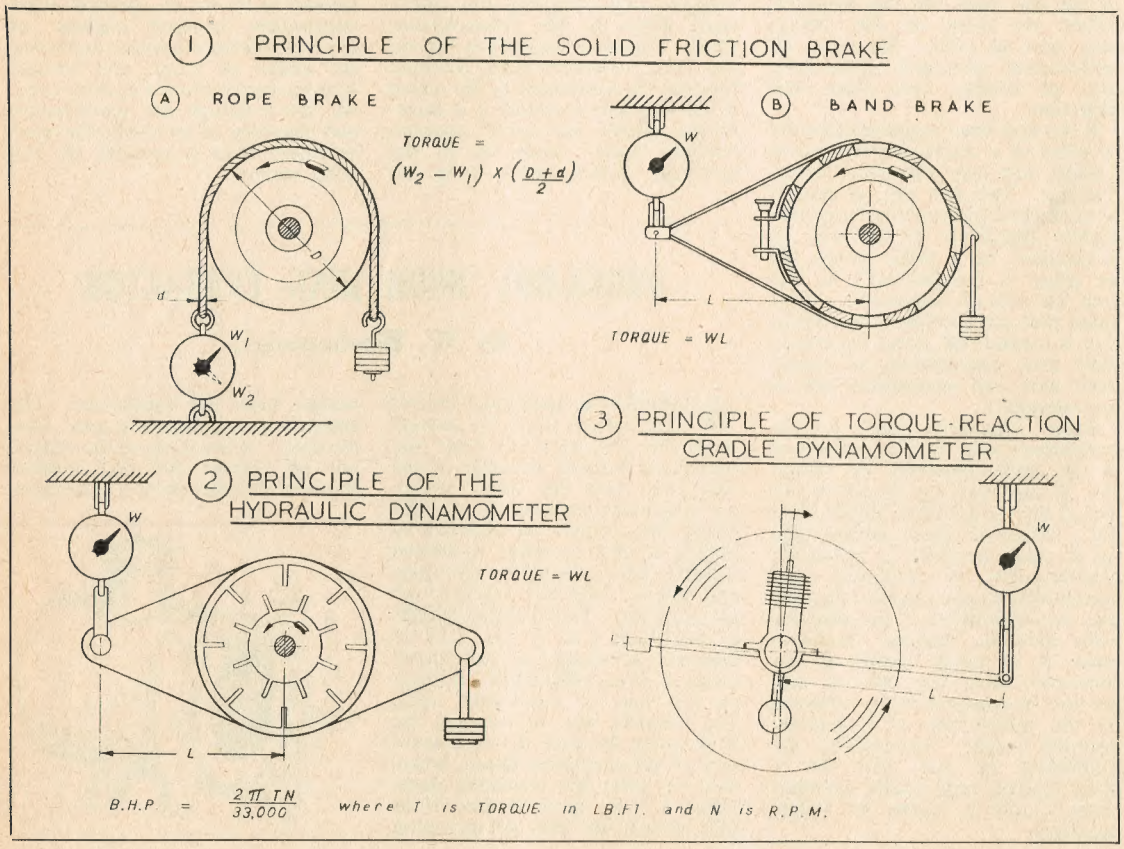
The simplest type of dynamometer is the solid friction brake which, in its crudest form, consists merely of a rope wound once round, or partly round, the flywheel (or around a special rim attached to the flywheel) and from one end of which weights are hung against the direction of rotation, while the other end is anchored via a spring balance. When the engine is running, torque is measured by noting the amount by which the scale reading is reduced, and multiplying this by the moment arm through which it is applied.

A development of the rope brake is the band brake, and various types of band brakes have been built for model use, particularly for testing stationary and marine engines.

Undoubtedly, the most satisfactory apparatus for testing modern high-speed miniature i.c. engines is, however, the torque-reaction cradle dynamometer. It is particularly useful when airscrews or fan brakes are used as a means of loading the engine and has, in fact, been used for many years in the testing of full-size air-cooled engines. There are, however, certain precautions to be observed if the accurate results possible with this type of apparatus are to be achieved. These we shall mention in a moment.

The cradle dynamometer consists, essentially, of a freely hung mounting, to which the test engine is fitted so that its crankshaft is parallel to the axis of suspension. When the engine is running, the torque-reaction, acting on the engine casing, is transmitted to the mounting and tends to rotate it. This torque can be weighed by means of a horizontal beam and sliding weights, but a better system is to ballast the moving assembly so as to bring its centre of gravity well below the axis of suspension and then to measure deflection by means of a suitably calibrated scale.

The most convenient method of loading the engine is then to use airscrews or simple fanbrakes. These, too, have the merit of providing cooling to the engine, which should ensure that it is operating under similar conditions to those encountered when it is installed in a model. There are two other incidental advantages with fixed pitch airscrews or fan brakes. The first is to be found in the fact that, as each propeller requires a fixed amount of power to rotate it at any given speed, torque readings give a cross-check on r.p.m. if, from the results of previous tests, a set of absorption curves is plotted for the airscrews over a suitable r.p.m. range. The second applies particularly to model aircraft engines, and is that operational starting conditions are faithfully duplicated during tests over a wide range of speeds, in that hand



starting is usually employed.

This set-up is open to one major criticism, which is that the spiral slipstream from the airscrew may adversely affect the accuracy of torque readings by the fact that it will impinge on one side of the cylinder or any other exposed parts of the moving assembly.

This objection may, however, be overcome in one of two ways. First, all the exposed parts, including the cylinder, may be shielded by means of a pair of simple " doors " that will slide into position for the few seconds needed to take readings of r.p.m. and torque. These can be operated, if need be, by a simple foot switch. Alternatively, " pusher" airscrews can be employed. With the air being directed forward instead of backward, the only air movement over the dynamometer would be the inflow to the airscrew blades, generally adequate for cooling, but virtually parallel, and therefore, of no effect to the moving assembly. Not all mass-produced model engines are ideally suited to " pusher " operation, due to the fact that thrust faces are provided only on the front of the crankweb instead of on the back of the propeller driver or front of the crankcase nose as well. However, all ball-bearing mounted crankshafts are, of course, free from this objection.

It has also been suggested that the jet effect of a single sideways-facing exhaust duct may also affect torque readings. This risk can, of course, be eliminated by lowering the engine slightly (relatively to the axis of suspension) to a point where the jet effect is nullified—i.e. in line with the axis of suspension. (Provided that measurement or calibration is carried out about the crankshaft axis, concentricity of crankshaft axis and suspension axis is not essential.)

Other objections, such as the interference with the free movement of the cradle assembly by wiring, etc., do not have any foundation in fact, if the rig has been sensibly laid out. Where a direct reading type rig is used in which a pendulum counterweight is employed, any detachable accessory used to standardise the calibration of the machine with different engines mounted, must, if its entire weight is not concentric with the axis of suspension, be compensated on removal by the substitution of a suitably disposed weight. Incidentally, the calibration of the dial for a direct-reading type cradle dynamometer is only a matter of simple geometry.

The construction of such a rig presents no problems to the model engineer. The writer would, however, like to emphasise that it is better to err on the heavy side, than to make the apparatus too light, in the mistaken belief that a lightweight assembly will be more sensitive and thus more accurate. In practice, the vibration transmitted by even the smallest engine is sufficient to prevent any stickiness in bearings as large as 1-in. i.d. double-ball journals used to support the moving assembly. At the same time, such vibration can prove troublesome if the entire apparatus is too light—especially where a beam and weights system is used to measure torque.

Nowadays, the hydraulic dynamometer and the swinging-field or eddy-current electrical dynamometer are, of course, the most widely used power testing machines in full scale practice. For full-scale work, particularly as most engines tested are liquid-cooled types, and, with ancillary equipment, are not so self-contained as the average model engine, this type of equipment is much more convenient to use, as it involves only coupling the crankshaft direct to the dynamometer shaft. Torque is weighed as before, the force, however, being recorded through the movement of the casing of the machine to which it is transmitted either via water pressure between radial vanes, as in the hydraulic dynamometer, or by the drag of the magnetic field, as in the swinging-field electrical dynamometer.

Both types of dynamometer can, of course, be built for model use but, apart from the complication of such equipment, there are practical disadvantages which are not necessarily outweighed by advantages. The most attractive feature of such a dynamometer for model use is the fact that load can be varied while the engine is running. Against this is the fact that a separate cooling system must be devised for such protracted operation and, in the case of a model aeroplane engine in particular, normal operating conditions are not so faithfully duplicated, and a separate series of tests must be carried out to determine " startability " with different airscrews fitted.

Although a dynamometer registers only torque, simple calculation (knowing the swept volume) will give us brake mean effective pressure, as well as b.h.p. B.M.E.P. is a particularly useful figure to have, since it tells us more about the medium and low-speed performance of the engine and, since it is always expressed in lb./sq. in., permits direct comparison between engines of entirely different capacities and types. By means of b.h.p. and torque/b.m.e.p. curves plotted against r.p.m. we can evaluate the performance and character of an engine far more positively than is possible by any other means.

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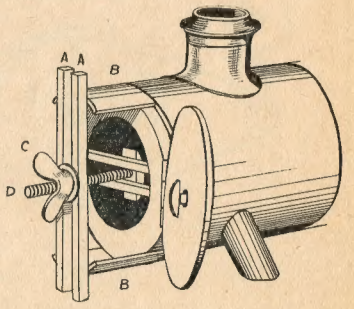
# SMOKE-BOX DOOR RING EXTRACTOR

## By W. Birchenough

WITH the 5-in. gauge locomotives and larger, there is enough room for the hand to enter the smokebox without removal of the ring; but with the 3½-in. gauge, the ring must be removed. A well-fitting ring cannot be removed by pulling on the crossbar, a process which is apt to bend the blast-pipe and others. The safe way is to use an extractor. Two parallel lengths of mild-steel ¼ in. × ⅛ in. (*AA* in diagram) are brazed to two curved pieces of brass (*BB*) which will bear on the end of smokebox walls. The simplest way of ensuring the fit is to lay the bars *AA* on a spare slice of the smokebox barrel, braze, then cut away the unwanted parts. Make a ¼ in. screwed dart *D* to pass between the bars *AA* and put a washer under the winged nut. The engine's own crossbar is used with the dart. A few turns of the winged nut will extract the ring without strain on the smokebox and contents.



# Sixty Miles Non-stop

## MODEL LOCO'S RECORD RUN

THE world's long-distance record of 40 miles non-stop for miniature steam locomotives was broken on Saturday, May 22nd, by Mr. A. L. Clarke's 4-6-0 free-lance 5-in. gauge locomotive on the 1,149 ft. long continuous track of the Sussex Miniature Locomotive Society, at Beech Hurst Recreation Ground, Haywards Heath.

Earlier in the day Mr. J. I. Austen-Walton made an unsuccessful attempt on the same record. Starting at 8.15 a.m. with his 4-6-0 locomotive *Centaur*, he completed 24 laps (5.218 miles) before retiring at 8.52 a.m. with choked fire-tubes. The engine was using a new locomotive cylinder oil developed by Messrs. C. C. Wakefield & Co. Ltd., makers of "Castrol," who sponsored Mr. Austen-Walton's attempt.

The marathon run of Mr. Clarke's engine began at 11.46 a.m. with Mr. E. Widowson, of the Malden and District Society of Model Engineers at the controls, who covered 10½ miles in the first hour with a fastest lap time of 1 min. 4 sec. (12.2 m.p.h.), and went on to drive continuously for a total distance of 33½ miles in 154 laps when the locomotive's builder, Mr. Clarke, took over until lap 189/mile 41, followed by Mr. G. C. Smith until lap 222/mile 48. Another turn by Mr. Clarke brought the figures to lap 227/mile 51, the final stretch being made by Mr. T. P. Snoxell, who ran until lap 276, when an agreement was reached with the timekeepers to call a halt at 60.218 miles; time 5.51 p.m., though a "post mortem" revealed no defect in the engine which was, apparently, rearing to go for at least another 20 miles!

One of the most interesting features of the run was the neat arrangements for refuelling with coal and water, not to mention lubricating operations and the four changes of drivers, all of which were made without stopping the locomotive. Altogether, 30 lb. of "Phurnacite" and 20 gallons of water were consumed by the engine which kept up a good head of steam, and the water level in the boiler was maintained entirely by the ½-in. bore × ⅝-in. stroke axle driven feed pump.

*Spectators crowd round Mr. Clarke's engine after the record run.*

*Mr. A. L. Clarke "picking up" water for his record-breaking engine.*

This 4-6-0 is Mr. Clarke's sixth model and cost £55 to build. It has inside slide valves actuated by launch link type Stephenson gear to the design of G. S. Willoughby in THE MODEL ENGINEER and outside cylinders of 1⅝-in. bore × 2½-in. stroke.

The parallel all-copper boiler designed by Mr. Clarke has sixteen fire-tubes ⅝ in. dia. × 20 g. and four superheater tubes 1 in. dia. × 20 g. The Belpaire type firebox is 10 in. long and 2¾ in. wide.

This long-distance run forms part of a series of trials which are being conducted by the Sussex Miniature Locomotive Society on their new track. For the purpose of these trials, locomotives are divided first into their respective gauge, 3½ in. or 5 in., and then into either Class 1 for locomotives without carrying wheels and up to six coupled driving wheels, or Class 2 from "Atlantics" upwards. Mr. Clarke's engine, therefore, holds the record for 5-in. gauge, Class 2.

The next big meeting at the Beech Hurst track is on June 12th, when we understand formal trials will take place for locomotives in all four classes.

MORE UTILITY STEAM ENGINES

# Boiler Design and Construction

By Edgar T. Westbury

FROM the foregoing survey of typical examples of water-tube boilers used in full-size practice, it may be established that the following features are necessary for success in all boilers of this type:—

(1) Unrestricted flow through all the elements of the boiler in which circulation is required to take place.

(2) A substantial difference of temperature between the generating elements and the return passages or "downcomers."

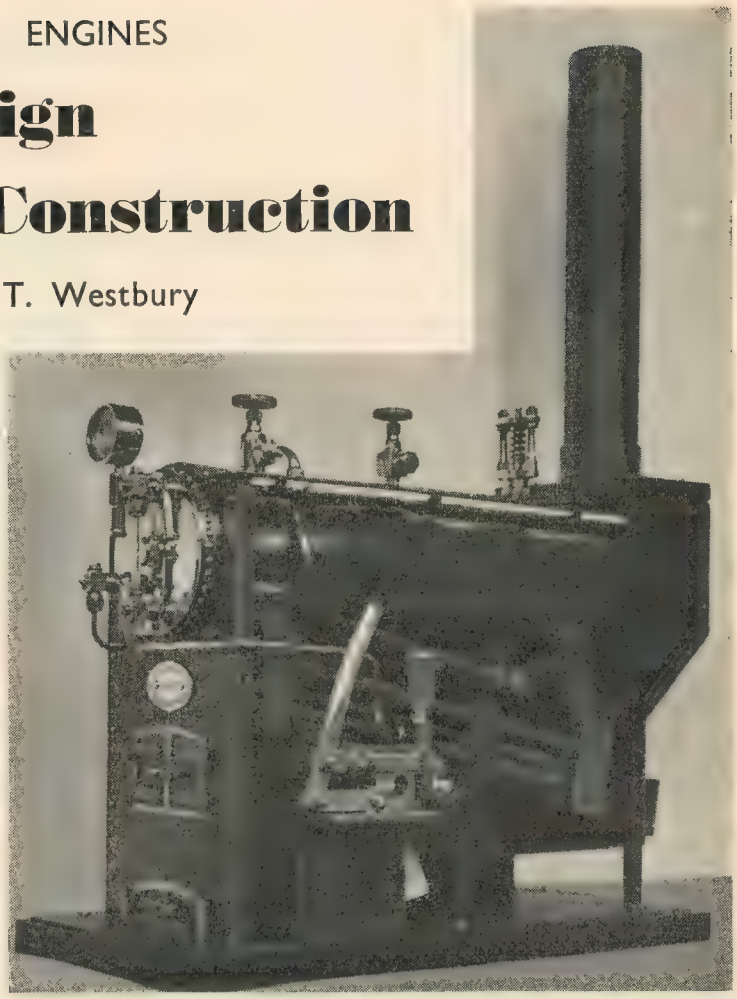
(3) A substantial difference in the level of the two ends of the generating elements, to take advantage of the upward flow due to convection currents, or some other device for procuring a similar result.

(4) Ample space in the steam drum or collector for separation of steam and water, and arrangements to avoid excessive turbulence in this space.

(5) Last but not least, rapid and efficient steam generation demands that a large area of conducting surface, arranged so as to be effectively heated by the furnace, should be provided in the generating elements.

A little consideration will show that all these essentials are more difficult to attain in a small boiler than in a large one; they all involve factors which will not work "to scale," and in some respects are incompatible with each other. No. 1, for instance, conflicts with No. 5, because to avoid resistance to the flow of water or steam, the internal size of the elements cannot be reduced beyond certain limits, whereas in order to increase surface area it is desirable to use a large number of very small elements. Incidentally, I use the term "element" rather than "tube" because boilers have been made in which narrow spaces between flat or corrugated diaphragms have been used instead of tubes, with some success; generally, however, the difficulties of constructing and staying such elements has limited their use, and tubes are almost universally employed.

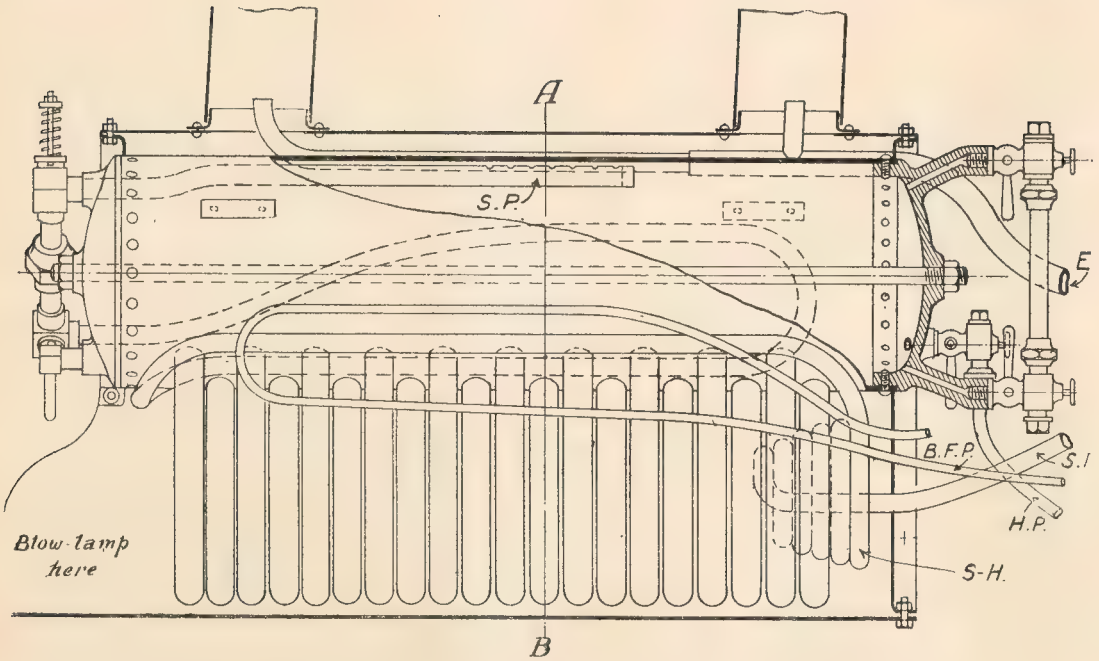
(*Continued from page* 583, *May* 27, 1954.



*A model boiler of the Babcock (land) type, with side of furnace removed to show tubes. Built by Mr. W. D. Shelton, of Rushden, and exhibited at the Bedford Exhibition*

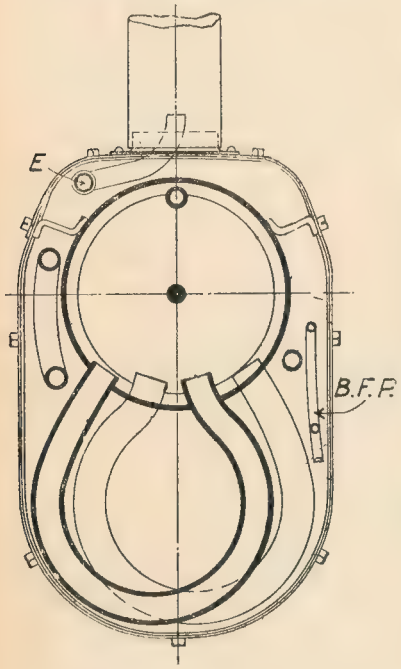
No. 2 is more difficult to attain in a small boiler because the heat is more rapidly conducted from one part of the boiler to another, especially as copper is the usual material for construction of such boilers. No. 3 introduces a very definite limitation in the rate at which circulation can possibly take place in a very small boiler; for a clear understanding of this, let us consider the nature of the forces which cause circulation to take place. Basically, they depend on the fact that the density of water decreases when it is heated, due to expansion of volume while mass remains constant. Thus in any vessel or system containing water, where temperature is not constant throughout, movements of the water, known as convection currents, are set up, the warmer water rising to the top and the cooler water sinking to the bottom.

This, of course, is the basis of all thermal circulating systems, or "thermo-syphon" circuits, as they are called; and where the flow is definitely channelled, to avoid interference between upward and downward movements, the rate of flow will depend not only upon the difference in temperature, but also on the height of the water column. In a large boiler, with generating elements several feet in height, circula-




*Side elevation of the boiler designed in* 1907 *by Mr. David Scott*

tion will obviously take place much more rapidly than in a small boiler where the maximum rise is only an inch or two, assuming that the temperature difference is the same in each case.




*End elevation of Scott boiler, section on A. B.*

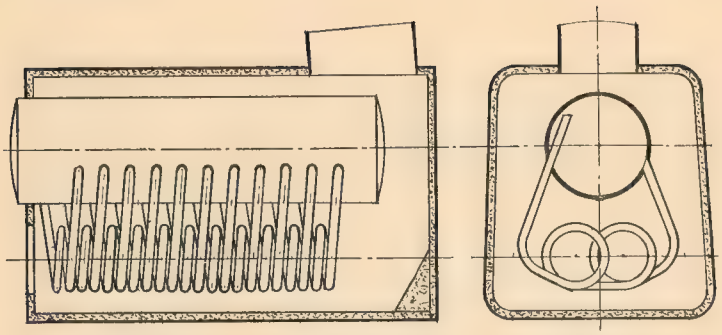
So far, however, we have assumed that the medium in circulation is liquid, but in any boiler, the water is necessarily in a state of transition between the liquid and gaseous states —that being, of course, the whole object of its existence. In the generating elements of the boiler, minute bubbles of steam are constantly forming, and rising much more rapidly than the natural convection flow of the water, thereby accelerating its rate of movement, in the same way as air bubbles are utilised in an air-lift pump. The circulation rate, once a boiler is in steam, is therefore, much higher than could be attained by simple convection currents alone, but the advantages are still with the large boiler.

If the steam bubbles can rise freely and escape at the top into the steam drum without too much commotion, the steam can be separated fairly effectively; but if there is any obstruction to their flow, either by restricted space, tortuous passages, or even too small a rising gradient in the elements, they may coalesce into much larger bubbles, and actually frustrate circulation by "steam lock." This is bad for two reasons; first, because interruption of normal flow results in intermittent and violent ejection of water and steam from the heated elements, tending to cause priming, and second, because steam is by no means such a good conductor of heat as water, and the effectiveness of the heating surface is thus reduced.

**"Dry-tube" Elements**

There is one respect in which small boilers have an advantage over large ones, however, and that is in the way that the steam can be used to augment circulation rate in the generating elements, by causing the latter to discharge into the steam drum well above the normal water level. This has been done in some kinds of large boilers, but always with some risk that while raising steam, or at low rates of output, the "dry" part of the element may become dangerously overheated; in small boilers, however, rapid heat conduction reduces this risk. It is necessary to take precautions against excessive turbulence in the steam drum when this method is employed, but as explained in the first series of articles on Utility Steam Engines, this can be done quite effectively, as in the case of the Blakeney water-tube boiler.

Referring again to requirement No. 5, it should be emphasised that while the ability of a boiler to keep up rapid circulation is highly important in respect of its *capacity* to



*The type of Scott boiler described by Mr. E. W. Hobbs*

produce steam, the primary factor in actual *production* of steam is the rate at which the heat can be transmitted to the water; thus no boiler can be efficient in terms of size in relation to output, unless it has a large area of steam generating surface, effectively heated.

After all this theorising, readers will no doubt be impatient for some information on how theory can be put into practice. As previously pointed out, I have no new or sensational ideas in boiler design to offer, but I propose to deal with some actual examples of boilers which have been successful in practice—sometimes, I must admit, by flying in the face of accepted theory, rather than by its strict observance !

**The Scott Boiler**

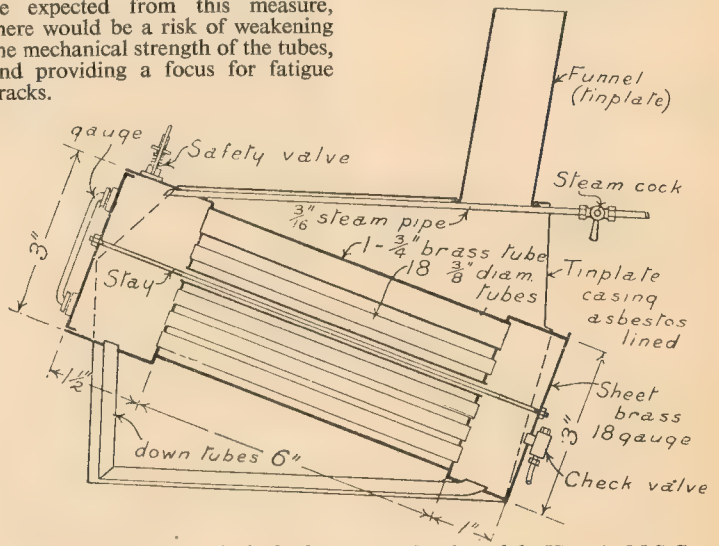
Many readers have asked for information on the Scott water-tube boiler, which appears to have been employed with success in many model marine power plants. On investigating this matter, I find that there is some element of mystery about this boiler, as I have seen boilers of widely varying design which have been described as Scott boilers; and it is by no means improbable that more than one designer named Scott has gone down in history by quite correctly giving the name to his particular contribution to design.

But so far as I have been able to ascertain by a careful search of early volumes of THE MODEL ENGINEER, the original Scott boiler was the one described in the issue dated February 4th, 1907, being the outcome of a competition for a marine boiler design, the first prize for which was awarded to Mr. David Scott, in respect of the boiler illustrated herewith. The salient features of the boiler need very little explanation; it was stated as being suitable for a racing model boat about 6 ft. 6 in. long by 7 in. beam (it should be noted that this was before the advent of the hydroplane into the racing arena, and when speeds of 8 or 9 miles an hour were considered sensational). It was intended to steam a $\frac{7}{8}$ in. by $\frac{3}{4}$ in. double-acting engine (presumably single-cylinder), at a working pressure of 180 lb. per sq. in.

The boiler was constructed of copper, having a steam drum 9 in. long by $2\frac{1}{2}$ in. diameter and 16-gauge thickness, with domed end-plates made from brass castings, stayed through the centre with a screwed rod $\frac{5}{16}$ in. diameter. Twenty water tubes $\frac{5}{16}$ in. diameter, each bent to a horseshoe shape, were brazed into the bottom of the drum, being alternately staggered as shown in the end view. A rather interesting feature about these tubes was that, before bending, they were screwed on the outside, with the idea of increasing the amount of heating surface. It may be observed that while some thermal advantage might be expected from this measure, there would be a risk of weakening the mechanical strength of the tubes, and providing a focus for fatigue cracks.

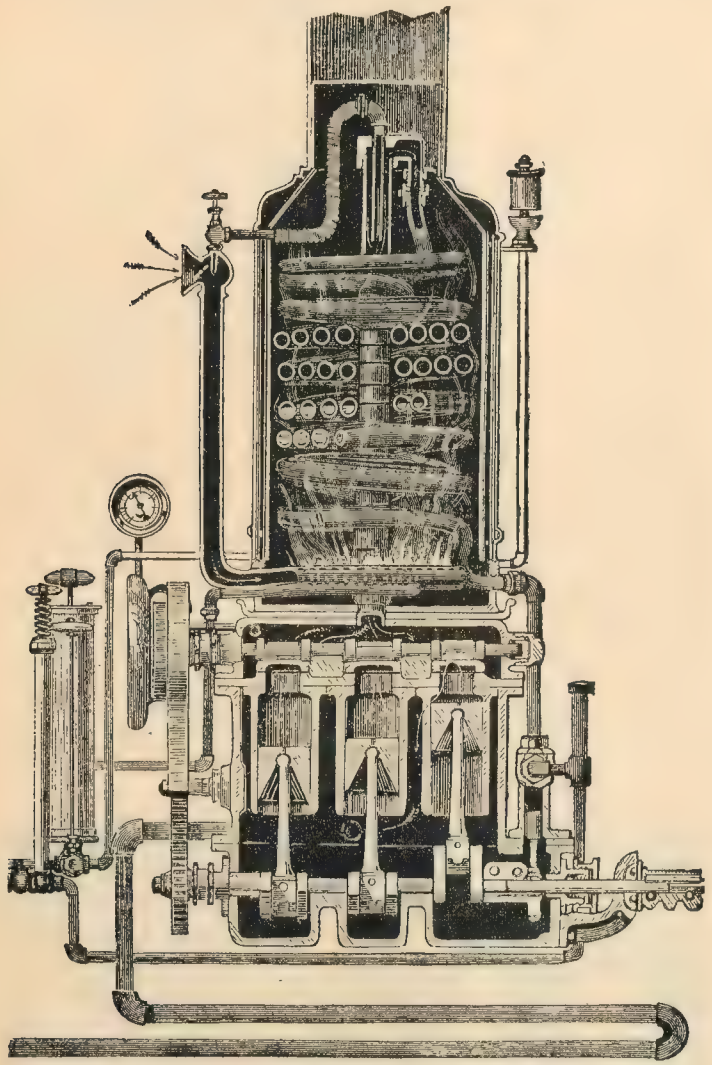
A superheater was fitted consisting of 4 ft. of $\frac{1}{4}$ in. diameter tube, formed into a loop at one side of the generating tubes, passing round the front end, along the other side, and then formed into a conical coil at the rear end, in line with the centre of the loop formed by the generator tubes, so that the flame of the blowlamp would impinge on it. The entire boiler was enclosed in a sheet metal casing, internally lagged with asbestos millboard, and a double uptake was provided.

At first sight it might appear that the conditions for rapid or orderly circulation in this boiler were not very good, as there was very little difference between the level of the two ends of the generating tubes; but bearing in mind that the boiler was intended for firing with an orthodox type of blowlamp, which produces a narrow, high-intensity flame with a propensity for inducing a stream of cold air to flow through the casing in its immediate vicinity, it is probable that there was a fair difference of temperature in the two legs of the loop, the one nearest the casing tending to act as a downcomer in each case. The fact that this boiler apparently served its purpose, and started a tradition in model marine boiler design, suggests that whatever theoretical faults there may have been in its design, it worked very well in practice. It was severely criticised by the experts, mainly on the strength of calculations (based on assumptions) in respect of figures for evaporative capacity in proportion to heating surface, steam used by the engine, and power required to propel the boat.




*A successful water-tube boiler by Mr. E. V. Pike, of the Victoria M.S.C.*

Mr. E. W. Hobbs, a well-known writer on model power boats in the first quarter of this century, gave a somewhat different version of a Scott water-tube boiler, in which the generating tubes appear to be in the form of staggered coils of not less than two complete turns each, one end being carried well above the discharge at a *downward* angle rather than otherwise. The coiled tubes of this boiler would appear to be prone to steam-locking, and could even, in some circumstances, boil completely dry; nevertheless boilers with this feature are used with quite reasonable success in model boats.



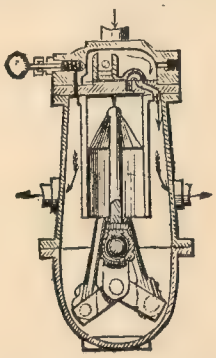
*Sectional side and end elevations of the Naphtha Vapour engine described in the issue of December 17th, 1953*

water level in the steam drum and discharging almost vertically upwards. It would appear extremely difficult to separate steam and water effectively with this arrangement; note that most of the successful "dry-tube" boilers, including the Blakeney, and others I have described, have arranged the tubes to

**A "Field Tube" Boiler**

In the competition referred to above, another entry, by Mr. E. Fitzgerald, described an interesting boiler with a steam drum 2 in. diameter by 12 in. long, fitted with 132 field tubes, radially disposed to the drum in six radial banks. The term "field tube" refers to a type of tube which has been used to some extent in full-size practice in the Niclausse and Durr boilers, being in effect similar to a concentric U-tube, the inner member of which serves as a downcomer, while the outer annulus forms a generating element. This particular boiler provided a large heating surface—400 sq. in.—and was fired efficiently by two large Primus burners, but there is no evidence that it ever became popular. Personally, I should not think that field tubes would work well in small sizes, as they do not provide a very free passage, and I do not know of any case where they have been successfully used. On the other hand, however, I know of several successful boilers of the "hedgehog" or thimble tube type, though these contribute nothing to promoting good circulation; and some examples of boilers similar in appearance to the latter, but fitted with *solid rods* instead of blind tubes, have given good results in practice.

Delving again into ancient history, another boiler illustrated in the same volume of THE MODEL ENGINEER, by our old friend "The Carpenter's Mate" (who, incidentally, was responsible for quite a few novel designs and a good deal of pioneer work in model marine steam plants) deserves at least a



passing mention. It was made by Mr. E. V. Pike, of the Victoria Model Steamboat Club, and is typical of a class of boilers which have been built in full size, and may be described as fire-tube boilers turned inside out. The headers at either end correspond to the firebox and smokebox respectively, in, say, a normal multi-tubular vertical boiler. For good circulation, one end of the elements must be raised considerably above the other; in some cases they have been set practically vertical. Mr. Pike's boiler was equipped with downcomers for returning water from the upper to the lower

header, and was fired by a blow-lamp, presumably of the usual torch type. In his description, "The Carpenter's Mate" remarked, "I was surprised at the efficiency of this boiler . . . (it) will raise dry steam in two minutes, and maintain . . . between 600 and 800 r.p.m. on the engine."

I make no apology for going back 47 years to find examples of successful types of small boiler design; I have always maintained that the pioneers can teach us something, even in this sophisticated age !

**More About Naphtha Vapour Engines**

Further to the notes on these little-known engines, in the issue of THE MODEL ENGINEER dated December 17th last, a good deal of correspondence has been received on this subject. One can always rely on assistance from readers in tracing any available information on an obscure subject, by reference to books or other literature which give further details, and I have been helped considerably in this and other matters thereby. Mr. B. J. Brierley, of Bradford-on-Avon, has loaned me a very interesting handbook, *Gas, Gasoline and Oil Vapor Engines*, by Gardner D. Hiscox, published in 1905, which gives some details of the naphtha vapour engine, including not only the identical view of the engine reproduced in my article, but also a sectional view which explains the internal details of both the engine and the "retort" or boiler.

Book illustrations, especially fine-line engravings, are always difficult to reproduce, but I trust that our process engravers have been able to make something of this one, as I have a high regard for their skill in these matters. It will be seen that the "retort" contains a number of flat spiral coils, similar to the flash boilers which have been used in steam cars, and is heated by a large diffused-flame vaporising burner. The engine is of the three-cylinder single-acting type, with ball-jointed pistons, and vapour distribution is by three separate slide valves, moving in the cross plane, apparently operated directly by eccentrics on an overhead shaft.

The latter is driven by spur gearing from the crankshaft, and the hand wheel contains an internal gear sector which controls the phase relationship of the gears, so that by moving this wheel in either direction, the engine is timed to run in that direction; the result is the same as using a slip eccentric gear, though mechanically more elaborate. Vapour exhaust from the engine is condensed in a looped tube outside the boat, and the condensate discharged back to the tank. Taking these additional particulars in conjunction with my previous description, readers should be able to obtain a good general idea of the plant design, and though I am still dubious about running any engine on inflammable vapour, I think that the same general system, with obvious modifications, might be used in a compact and efficient steam plant.

*(To be continued)*

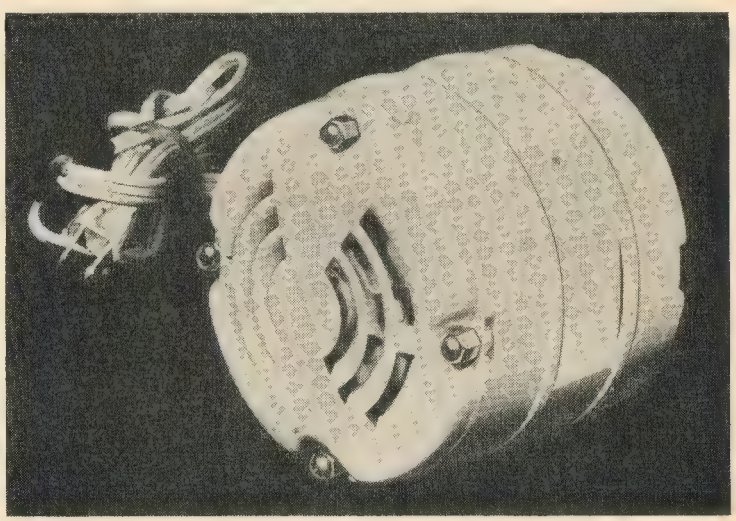
# SHADED-POLE ELECTRIC MOTORS

A VARIETY of special-purpose shaded-pole induction motors is now in production by Messrs. Hoover (Electric Motors) Ltd., at their Cambuslang, Lanarkshire, factory. These are the result of long experience in research in this particular type of motor and represent considerable technical advance over such motors hitherto available.

The particular motor illustrated is of the 6-pole type, of 1/10 h.p., having a diameter of approximately 5½ in., and intended specially for driving a fan of 20 in. diameter, at a speed of 900 to 950 r.p.m. Four-pole motors, producing 1,400-1,450 r.p.m. are also produced. This form of motor has been successfully applied to the well-known Hoover washing machine, which is now made in a larger size, in addition to that originally produced. Many other types have been built to suit special applications; all types are fitted with large oil-impregnated sleeve bearings.

The term "shaded-pole" is applied to a class of a.c. induction motors, having, in common with other motors of this type, windings on the stator only, the rotor being of the normal "squirrel-cage" type, without windings. Unlike the ordinary induction type of motor, however, they are not fitted with starting windings; in their place, starting torque is obtained by "shading" a portion of each stator pole by means of a closed copper ring, which has the effect of delaying the rise and fall of magnetic flux in this part of the field, and thus producing an initial rotary impulse on the rotor. This avoids the need for capacitors or special switching arrangements, automatic or otherwise, and as no brushes or internal contacts are used, no interference with radio or television reception is caused.

Shaded-pole motors are not well suited for purposes where they have to start under load, as the starting torque is limited; they serve best for fans and similar duties where the starting load is zero. They tend to be uneconomical if made in large sizes, as they usually have a rather low power factor, but for small power purposes their simple, robust and relatively inexpensive characteristics are important assets, and if reasonably well designed and built they will give long trouble-free service. Note that they are suitable for working only on a.c. single-phase supply.



# Model Power Boat News

BY MERIDIAN

## PETROL ENGINE CASTINGS

FOR anyone contemplating the construction of an i.c. engine, the availability of castings is an important matter. Unfortunately, the present-day position is worse in this respect than prior to the war, when quite a few different firms produced castings for several types of engines. Both two-stroke and four-stroke designs were available in the popular 30 c.c. and 15 c.c. sizes.

For the model power boat movement, this state of affairs was excellent, for not only did it assist established power boat enthusiasts, but was often the means of introducing newcomers. A constructor would make an engine from a set of castings, and when completed, would look round for something for it to drive. Nine times out of ten it ended up in a power boat ! Many well-known exponents commenced their boating activities in this fashion, and perhaps, in the beginning, never intended to do anything else except make a petrol engine.

There is no doubt that a set of castings makes life much easier where i.c. engine construction is concerned, and indeed, I always feel that if one is in possession of a set, they offer a positive inducement to get cracking on the lathe.

For the beginner who would like to make an engine, the position is difficult. It is true that there are some castings available, but the choice is limited, and some intending constructors may be put off because of the amount of work. Multi-cylinder designs, for example, are unsuitable for the raw beginner, and it is desirable that some experience be gained before tackling an engine like the " Seal " 4-cylinder design.

The cost of a set of castings at the present time is also somewhat staggering when pre-war prices are remembered; but this is in common with most engineering products—remember those lathes that cost but 30s. or so back in 1939 !

One way over the casting problem is to hack the various parts from the solid, but the amount of work is increased, and large sections of material are expensive and difficult to obtain in most towns.

Duralumin is to be preferred to drawn aluminium if it is decided to make from the solid. Aluminium of this type is rather soft and may not machine nicely, also duralumin is much stronger, and sections may be made very much thinner, thus reducing weight.

There is an alternative to all the foregoing difficulties—make your own castings !

The photographs reproduced here show what can be achieved with perseverance. The patterns and castings are for a 30 c.c. racing engine, and are the work of Mr. N. Hodges of the Orpington Club. I have examined the castings carefully and I must say that they are first-class, and equal to the best products of professional foundries. This result has not been obtained without much effort, and there were many trials and tribulations before reaching this standard.

Mr. Hodges has had no previous experience in making castings, and much has been learnt by the method of trial and error, although, of course, reference was made to such published information as was available.

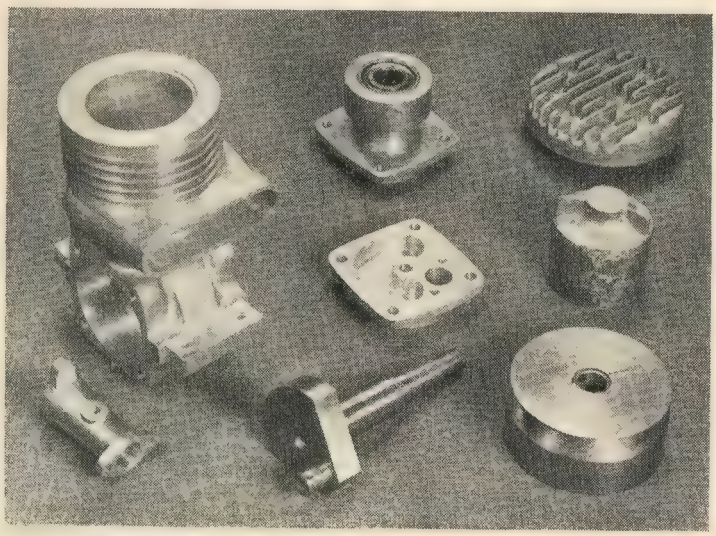
There have been several articles on the subject in THE MODEL ENGINEER, for example, within the last few years.

The main casting, in particular, provided problems, mainly with regard to coring. The cores were prepared in a core-box made of plaster, and this was quite satisfactory for producing them.

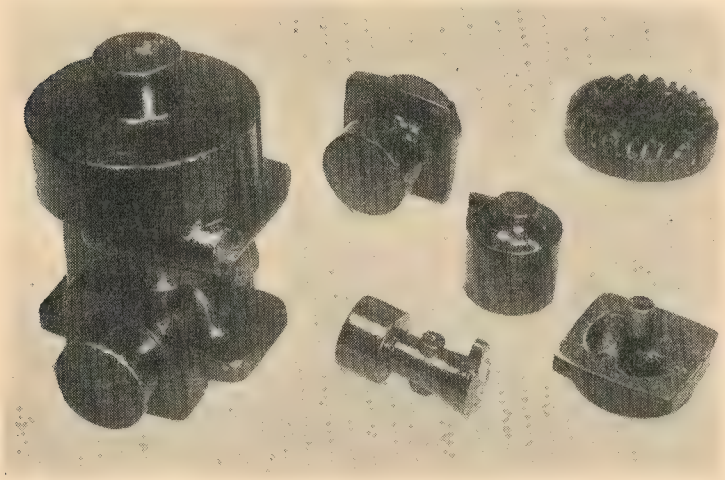
In the early attempts, however, much trouble was experienced with the cores breaking up or causing blow-holes—this in spite of the fact that they were baked in the oven and apparently free from moisture. This trouble persisted until some " Bentonite " was obtained and used in preparing the cores. For fine castings of this nature, proper moulding sand, etc., is a necessity, and the mould must be well vented at places where air bubbles are likely to form. A riser is used to give a head of metal above the highest point of the pattern.

In case readers may think that all this required much expenditure, let me hasten to say that apart from the sand and a plumbago crucible (costing a few shillings) all other equipment was quickly made in the workshop. The furnace is the kitchen boiler, and with the dampers out, several pounds of aluminium can be melted in a short time.

Scrap motor-car pistons, obtained from a local garage, provided the raw material, and while it may be



*Machined castings and other parts for Mr. Hodges' engine*



*The patterns for Mr. N. Hodges' 30 c.c. speed boat engine*

said that in remelting pistons, some of the qualities of the alloy are lost, in practice the castings appear to be more than adequate in strength and machinability.

For those who may have insufficient time, or do not feel up to tackling the job in the above fashion, there are cruder methods of making castings, to fall back upon.

It is not a very difficult matter to melt aluminium in smallish quantities. If the kitchen boiler is to be used for the furnace, a crucible of the plumbago type is really necessary in preference to a steel pot, but melting can also be accomplished with the aid of a blowlamp. A blowlamp of the model power boat pattern is quite suitable for the job, and if the broken-up metal is placed in a stout tin, surrounded with some coke or bricks, it can be readily melted. Some sort of tongs are necessary to keep the operator a reasonable distance from the molten aluminium, and care must be taken not to spill any of the hot metal where it can do damage, either to the operator or lino, etc. It is best done out of doors.

Simple castings, i.e., cubes, round bars, and elementary shapes, may be cast in open moulds. A bucket of sand, damped sufficiently to cling together, will retain impressions of simple patterns without breaking down when the molten metal is poured. Plenty of allowance should be provided on the pattern, as coarse sand will leave a poorish finish, and there may be a certain amount of surface pitting.

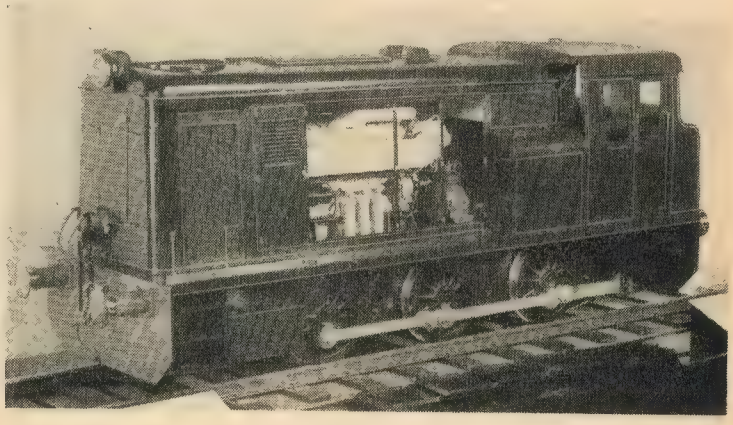
I have produced simple castings using thin sheet steel moulds bent accurately to shape. They are made open at both ends, and stood in a tray of sand, which seals one end. This method has the advantage of producing a good finish, but the mould should be made of ample length, as the metal shrinks down upon cooling. These sheet metal moulds can only be used once, as they are generally damaged when extracting the casting. I should have mentioned, by the way, that the joint must be riveted, and not silver-soldered, when constructing a mould, as the whole thing gets red-hot as soon as the molten metal is poured in.

These cruder methods, although not producing castings up to the standard of those emanating from the foundry, at least give one something to work upon, and the cast metal will usually machine easily, with a good finish.

In the recent article by Mr. J. A. Bamford, I notice that he refers to the crankcase casting produced by a "crude method," and the simple crankcase of the engine described is an excellent example of what can be made in the way of castings, without any of the equipment of the foundry proper.

# MODEL DIESEL-HYDRAULIC LOCOMOTIVE

FOR Davey, Paxman & Co. Ltd., a very fine 1-in. scale model of one of the Mauritius Railway's six-wheel diesel-hydraulic locomotives has been made by Exley, and supplied through Edward Exley (Sales) Ltd., of Bradford. The side doors of the casing are removable to show the Paxman pressure-charged 12RPHXL-II engine, Brown Boveri pressure-charger, Vokes oil filters and the engine-driven air compressor. The mechanical portion details are complete and exact down to the screw couplings, brake hoses, handrails, etc., and the cab contains a replica of the driving and instrument desk with controls. The prototype is a 51-ton 605 b.h.p. unit, one of two built recently by the North British Locomotive Co. Ltd., and that company is to show it later in the year at the Scottish Industries Fair.

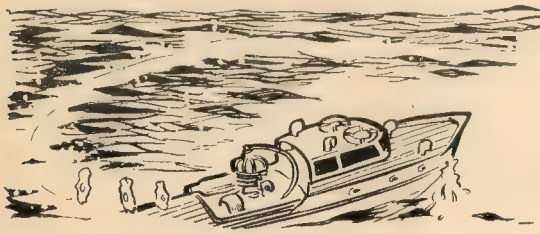


# REGATTA REVERIES

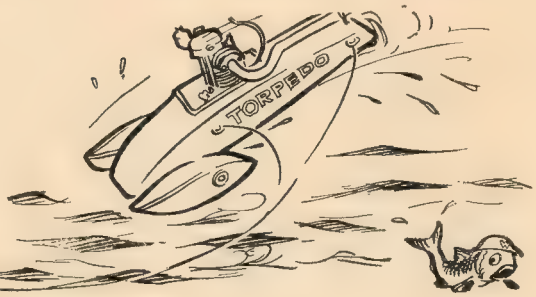
## By Mrs. Model Engineer

We sit upon a lakeside brim,
Our loving thoughts are all of him -
The lord and master of our fate,
Our loving and beloved mate !

And there we sadly visualise
The sight that's going to meet our eyes,
The darkened brow and heavy sighs,
Should hubby fail to win a prize.



And be it wet or be it warm
We view proceedings with alarm
When hubby's boat in final test
Tho' set north-east yet sails north-west;
Or steering like a thing possessed
By-passes bulls with joyful zest.




Whilst in the Nomination Race
It *will* not keep a steady pace,
Whether he timed it with great care,
Allowed for wind and weedy snare,
Or chose a number with a pin
When well lit up on lime and gin !
No matter how they were compounded
His calculations stand confounded !

Now study well the hydroplane—
A silver cup it ought to gain !
But watch the darn thing loop the loop
Or plunge in pond with mighty swoop !
Or peter out with humbling crawl—
That is—if it will start at all !

We sit upon the lakeside brim,
Our loving thoughts are still of him—
Of how we'll sooth and sympathise
And say he " ought to have a prize "—

And all the time we're telling lies !

# The new B.R. Lightweigh

A NEW lightweight diesel train which was inspected at Marylebone recently prior to a demonstration run to Beaconsfield (Bucks) and back, is the first to be built under the British Transport Commission's £2-millions programme for the development of lightweight diesel passenger services on British Railways; this programme provides for the introduction of multiple-unit diesel trains in six areas: West Riding of Yorkshire (B.R. North Eastern Region)—8, two-car units; West Cumberland (London Midland Region)—13, two-car units; Lincolnshire (Eastern Region)—13, two-car units; East Anglia (Eastern Region)—13, two-car units; Newcastle-Middlesbrough (North Eastern Region) and Edinburgh-Glasgow (Scottish Region).

In all these areas, lightweight diesel units will operate partly in substitution for existing steam services, and partly in addition to them. The greater economy, flexibility and cleanliness of the diesel railcars on suitable selected routes is expected not only to enable existing services to be worked at lower cost, but also to provide more attractive facilities which will create fresh business.

Except in the case of the proposed Edinburgh-Glasgow route, where the design will conform to the requirements of a longer-distance intercity service and will include additional amenities such as a buffet, the basis of the new type of service will be a two-car unit, one vehicle being powered by two Leyland bus-type horizontal engines of at least 125 h.p. under the floor, and the other a trailer or another motor-coach as required. Each two-car unit can be driven from either end, and can be operated either as a self-contained unit seating about 130 passengers, or alternatively, can be fitted into multiple-unit trains of four, six, or eight vehicles, according to traffic requirements. This system offers the advantage of being adjustable to traffic demands up to over 500 passengers, while making for economical working when traffic is light.

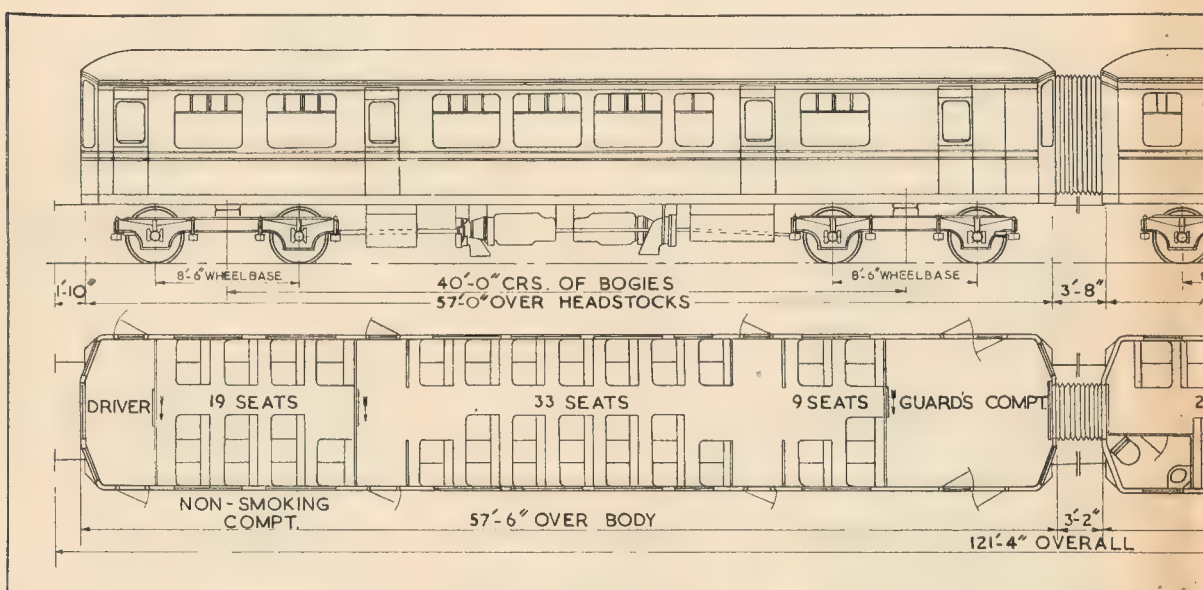
**Designed for Heavy Gradients**

The train used for the recent demonstration has been built at British Railways' Derby Works, with power units supplied by Leyland Motors. It consists of two identical two-car units, four vehicles in all. Each two-car unit comprises: Motor Composite Car, 57 ft. 6 in. long over body, seating 16 First Class and 53 Third Class passengers; Motor Third Brake, also 57 ft. 6 in. long, seating 61 Third Class passengers. Total seating, two cars, 130 passengers.

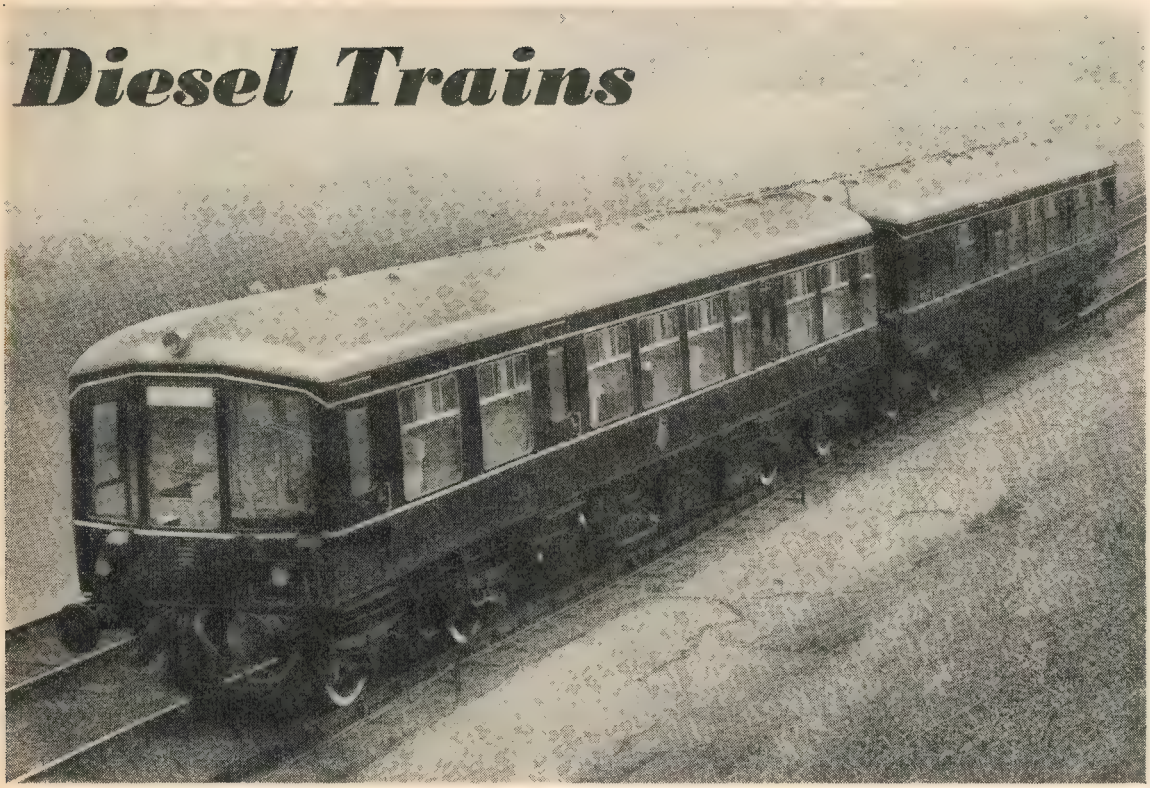
The Composite car has lavatory accommodation, and the Motor Third Brake a compartment for the guard, luggage and parcels. Passenger seating is arranged on each side of a centre gangway, and the two vehicles of each unit are vestibuled together by a corridor-connection similar to that used on long-distance trains. Two doorways on each side of each vehicle give access to the passenger accommodation, with separate doors to the driver's and guard's compartments.

**Extensive Use of Light Alloys**

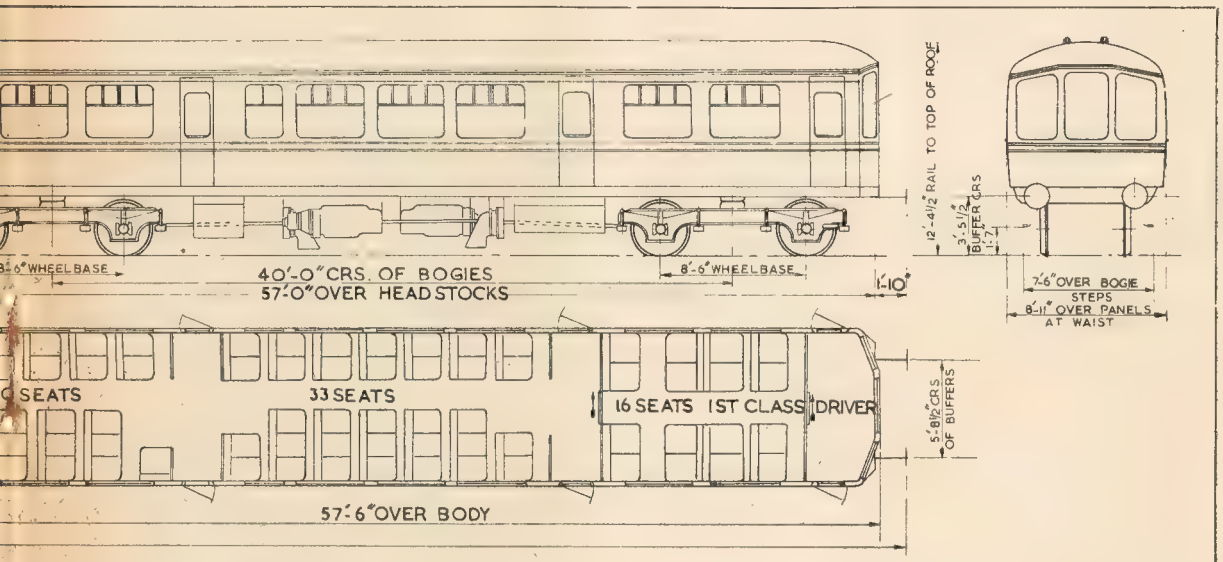
A special feature of the design is the extensive use of light alloy metal. The bodies and underframes of each car are fabricated as one unit, giving great strength with comparatively light weight; including the four 125 h.p. Leyland power units (two to each car) and 232 gallons of diesel fuel, the weight of the two cars together is 54 tons.



# ht Diesel Trains



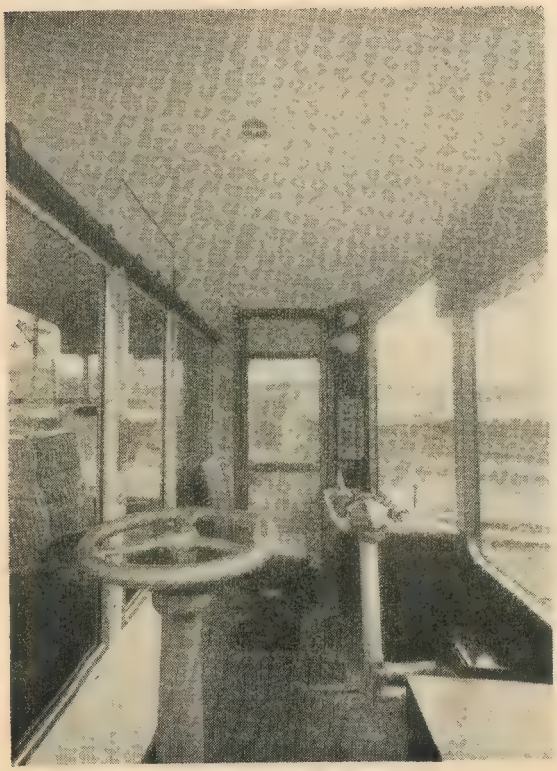
*This photograph shows an external view of the two-car unit*



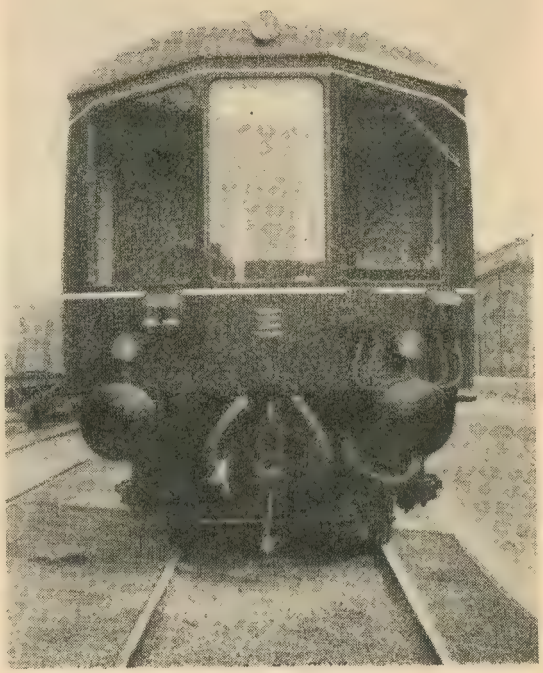

S 114 SEATS

MOTOR LAVY. COMPO.
FIRST CLASS 16 SEATS. THIRD CLASS 53 SEATS

4 LEYLAND ENGINES 125 HP EACH



*Internal view of the driver's cab*



*Head-on view of the driving end*

(The combination of two powered vehicles, with an aggregate horsepower of 500 h.p., in the type of unit demonstrated, is required for the steep gradients of the West Riding lines on which this series will be used. In some areas only one motor vehicle will be needed for each two-car unit.)

Transmission from each engine to the driving axle of each four-wheeled bogie is through a torque converter; the electro-pneumatic driving controls are arranged for simplicity and convenience of handling, and the driver has an absolutely clear view ahead. Vacuum brakes are used on all wheels of each vehicle; they are automatically applied to stop the train should the driver release the control handle.

**Rapid Acceleration**

The unit which we saw demonstrated is geared for a normal maximum service speed of 62 m.p.h., which is fully adequate for the type of service on which it will work; but with the rapid acceleration of this type of unit, this speed is reached more quickly than with a steam train working the same kind of service. The normal crew complement of the lightweight diesel trains will be driver and guard.

**Additional Technical Notes**

The body frame, underframe structure, and panelling is of light alloy and is designed as an integral unit in order to achieve lightness combined with strength. All framing members are of extruded sections riveted together with light alloy rivets. The panelling is welded by the argon arc process to form continuous sheets from door to door and is then riveted to the frame members. The floor is constructed of extrusions of special section and forms part of the structure; this is covered in turn with two thicknesses of flameproof hardboard with an overlay of linoleum. The whole of the inside of the body and the underside of the floor is sprayed with asbestos to reduce condensation and noise.

The interior panelling is of flameproof hardboard covered with P.V.C. cloth, the colour scheme being varied. The seats have frames of tubular steel and are trimmed in maroon moquette in the third class and blue uncut moquette in the first class. Luggage racks formed of light alloy tubes of square section are provided on both sides, running the complete length of the compartments.

The exterior of the bodies is quite pleasing, being finished in B.R. engine green, relieved by yellow lines at the waist and above the windows.

The bogies are of conventional design in mild steel, the main framing members being riveted together, and the individual members being part fabricated. The bolsters are fitted with spring side control, and resilient rubber mountings carry the centre castings and side friction blocks. The axles are carried on roller bearings.

The engines are electro-pneumatically controlled and can all be operated from any one driving position. The control handle is so arranged that should it be released by the driver, after a five-seconds delay the engine speed will be returned to idling, the torque convertor placed in the neutral position and the brakes applied to bring the train to a standstill. The driver is provided with a speed indicator, engine revolution indicator and window wiper; his seat is of the adjustable bucket type and all controls are within easy reach.

IN THE WORKSHOP
BY DUPLEX

# Constructing an Engraving Machine

AS shown in Fig. 49, the motor assembly is mounted on a swinging link, to which is attached a tie-rod for maintaining a constant distance between the motor and the cutter head, so that the belt tension remains uniform in all working positions.

The inner end of the linkage *Ga* is pivoted by means of two coned screws to the tracing table bracket plates *Ba* shown in Fig. 10. At its outer end the link assembly is pivoted to the motor pivot bracket *Gb* by two similar coned screws.

The tubular member *Gc* screws into the bracket, and is threaded and slit at its other end, so that, on tightening the clamp-nut, the curved tie-rod is securely held after the belt tension has been adjusted. The eye fitted to the end of the rod engages the shouldered nut on the lower end of the box-clamp spindle *Dk*, Fig. 35, which is set axially in line with the spindle of the cutter head. To the bracket *Gb* is also fitted the motor pillar *Ge*, which carries the adjustable bracket *Gf* for mounting the motor and aligning the belt. As shown in the drawing, the part *Gf* carries the triangular plate *Gg* for attachment to the end-plate of the motor.

*Continued from page* 590, *May* 27, 1954.

**The Driving Motor**

For driving the cutter head, any small, high-speed motor of some 1/10 h.p. will serve. The motor actually fitted was removed from a discarded vacuum cleaner. These motors are usually of the series-wound commutator type and run at high speed, but a cover may have to be fitted to protect the machine.

For this purpose, a household food-tin will often serve, and this will save the trouble of having to make a special casing from sheet material. On the other hand, some of the various types of surplus motors advertised in this journal will be found suitable; some of 1/20 h.p. to 1/10 h.p. are designed to run on the mains voltage, and others up to 1/3 h.p., intermittent rating, are of the low-voltage type, and have to be used with a transformer. Where a mains-voltage motor is fitted, it is essential to provide an earthing connection by means of a 3-pin plug and socket. For light engraving, the diameters of the two-step pulleys should be arranged to drive the cutter at some 5,000 to 7,000 r.p.m. or even more.

The wiring diagram of the motor and its control switch is given in Fig. 54 and, here the 3-pin plug is shown attached to the lower end-plate of the motor.

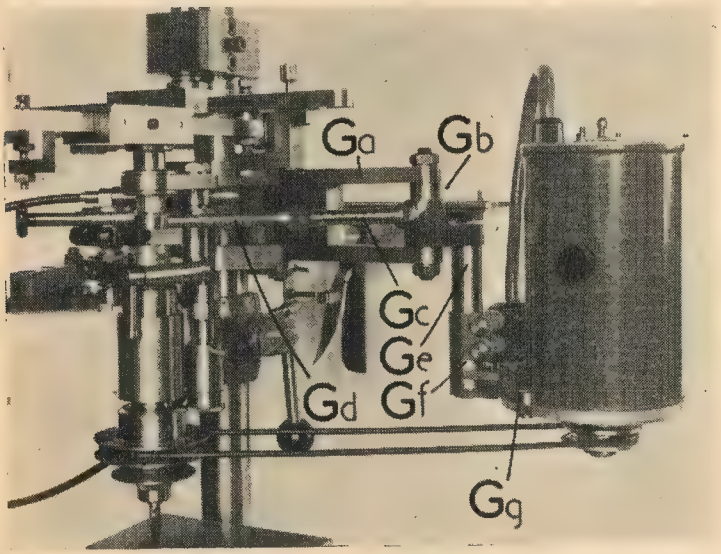



*Fig. 49. Ga—the swing link; Gb—the pivot bracket; Gc and Gd—the tie-rod assembly; Ge—the motor bracket pillar; Gf—the motor bracket; Gg—the motor mounting plate*

**Graduating the Pantograph Arms**

To enable the machine to be quickly set to engrave to any required scale, the two pantograph arms carrying the box-clamps are graduated and numbered. This is best done by first setting out the work on the drawing board, bearing in mind that two geometrically-similar triangles are formed by the pantograph arms and the stylus arm.

As the distance from the stylus to the upper pivot centre is 10 in., a line is drawn on the lower arm, 5 in. from the lower pivot centre, in order to represent a scale reduction of 2 to 1.

In the same way, to obtain a 5 to 1 reduction, the lower arm is marked with a vertical line 2 in. from the lower pivot centre.

When the lower arm has been marked-out in accordance with the scale reductions required, a centre-line is drawn through all the vertical index-lines. The points of intersection so formed are joined to the centre of the stylus by lines marked-out on the arm carrying the box-clamp on which the pantograph frame pivots.

By this means, a second series of intersection points is obtained, and through these are drawn lines at right-angles to the long axis of the arm. Reference to the diagram Fig. 55 will, perhaps, help to make this description more readily understood.

When transferring these measurements to the pantograph arms themselves, the index lines are scribed with reference to the adjacent edges of the two box-clamps and, at the same time, the distance between the ends of the clamps and their pivots must be subtracted from the measurements previously obtained.

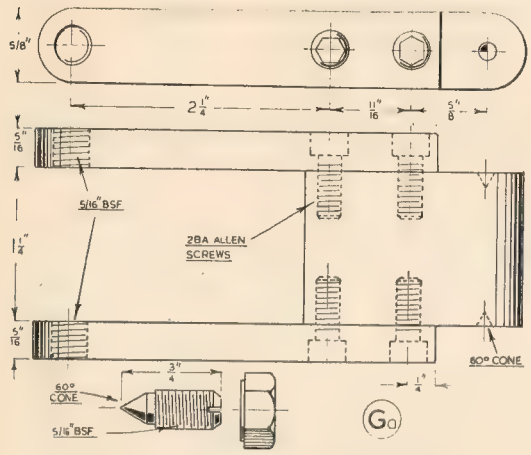



*Fig. 50. The swing link carrying the motor*

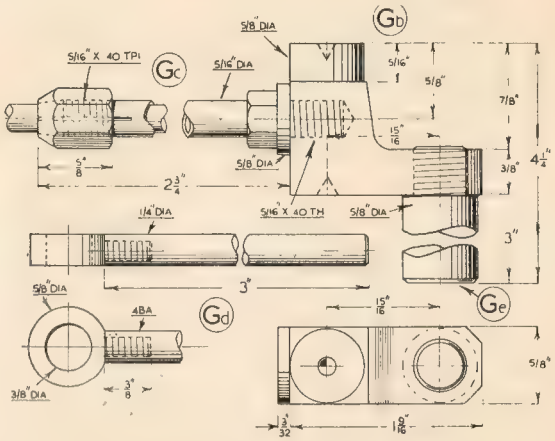



*Fig. 51. The pivot bracket and tie-rod parts*

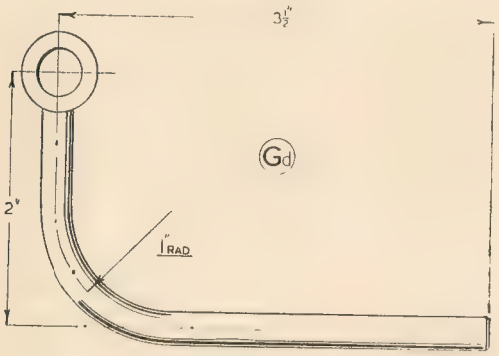



*Fig. 52. The curved tie-rod*

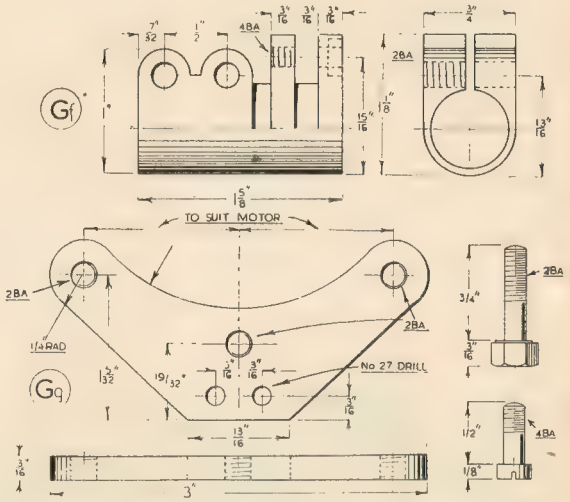



*Fig. 53. The motor bracket and mounting plate*

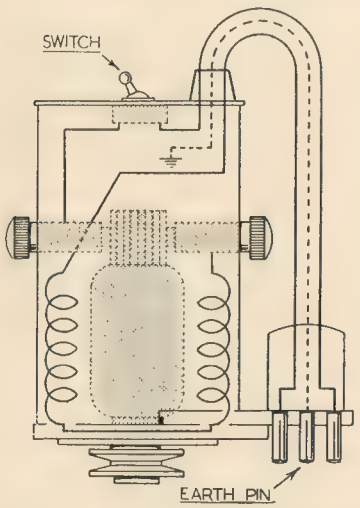



*Fig. 54. The vacuum cleaner motor with its casing and control switch*

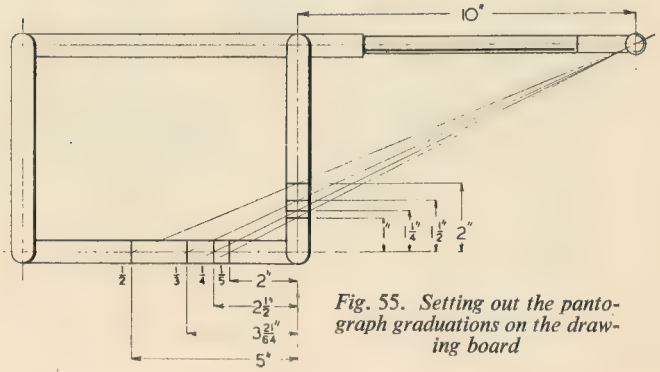



*Fig. 55. Setting out the pantograph graduations on the drawing board*

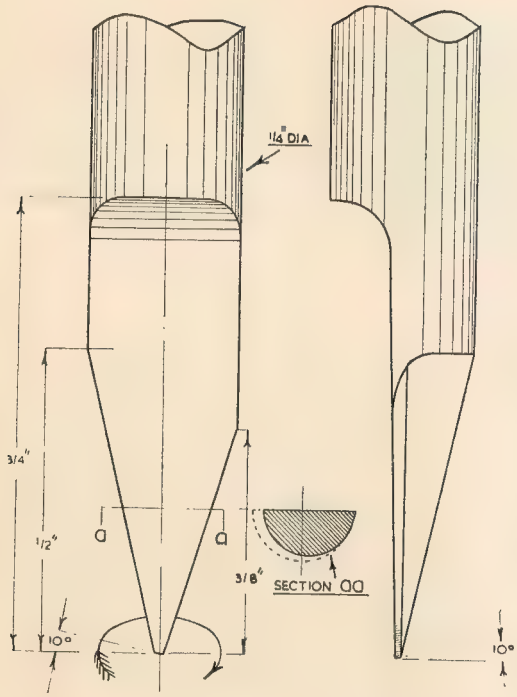



*Fig. 56. A tool with a ground back-off*

Fine graduation lines can be drawn with a sharp scriber guided by a square, and the figures are then marked with hand-stamps.

**Engraving Cutters**

The cutter with back-off behind the cutting edge, referred to in a previous article, is illustrated in Fig 56.

In practice, this back-off was not found to be of any great advantage, although a tool of this form certainly cuts freely in metal and will engrave to a good depth. A tool formed to a small included angle, and having a small flat stoned at the point, cuts the form of groove represented in Fig. 57A, this holds a wax filling much better than the groove of 60 deg. shown in Fig. 57B.

Moreover, if the work surface is not quite flat, a tool with a narrow point will ensure less variation in the width of the lines composing the engraved letters.

**Operating the Machine**

The following general instructions apply to the various forms of engraving described later in detail.

The work is clamped to the work table after being set square with the stencil on the tracing table; this is done by sliding the stylus along the rib of the stencil, and adjusting the position of the work to line up with the path travelled by the cutter. If necessary, the tracing table itself can be swung to either side to correct the alignment.

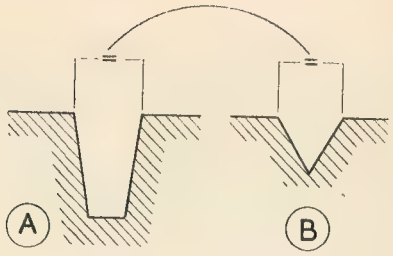



*Fig. 57. Sections of engraved lines; A—formed by a narrow-angle cutter with flattened point; B—cut with a 60 deg. tool*

The work table is next set to bring the point of the cutter almost into contact with the work when the cutter head is in the raised position. For aligning the lines of lettering it is best to start by engaging the stylus in the central limb of the capital letter "E."

The lettering can be centred, and the margins made equal, after first finding the positions of the first and last letters of the line by making a preliminary trial with the cutter kept clear of the work. However, it may save time if the work-piece is left fully large, and finally trimmed to shape after the engraving has been completed.

**Setting the Depth of Cut**

Slacken the clamp bracket of the Bowden control, and feed the cutter downwards with the finger-wheel into contact with the work. Then screw the stop spindle upwards until

*Fig. 58. Two examples of recessed engraving*

*Fig. 59. Figures engraved from commercial number plates*

it meets the stop-plate, and set the zero line on the micrometer collar to any of the long graduation lines of the micrometer index. The stop spindle is next turned back for the number of thou. in. to correspond to the depth of engraving required, and the cutter is raised clear of the work.

After engaging the stylus in the stencil, the motor is started, and the cutter is fed into the work for

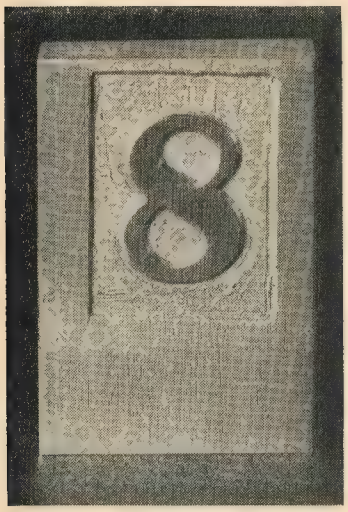


*Fig. 60. An example of relief engraving*

the full depth, by turning the finger-wheel. The clamp bracket securing the Bowden mechanism to the feed-screw can now be tightened and, after each letter has been formed, the cutter is raised to clear the work by means of the Bowden control.

**Recessed Lettering**

When using an angular cutter, it is important that the work should be flat, and of uniform thickness, in order to ensure that the engraved lines are of equal width throughout.

The brass plate illustrated at the foot of Fig. 58 was engraved with a 60 deg. cutter to a depth of 3 thou. in., but this is rather too shallow to allow of making a satisfactory finish with a wax filling. The circular, plastic tablet, which is one of a set made for fitting to the stops of an organ, was engraved with a 90 deg. cutter to a depth of 5 thou. in. Although the lettering, perhaps, looks a little clumsy, it conforms to that already in use on the organ, and the increased depth of cut gives a better hold for the wax compound. The word "stop" is, of course, short for "stopped" and was adopted for the sake of uniformity with the existing nameplates.

The large recessed figures with a double outline, shown in Fig. 59, were engraved by guiding the stylus round numerals used as number plates for house doors, and obtainable from most multiple stores. For this purpose, the numbers were attached to a strip of wood which was, in turn, clamped to the tracing table. The tablet illustrated was engraved to a depth of 5 thou. in. with a 60 deg. cutter, and the lines were afterwards filled with white wax.

**Relief Lettering**

The outlines of the figure shown in Fig. 60 were first cut in the aluminium work-piece to a depth of 10 thou. in. with a 90 deg. cutter, and the background was afterwards cut away to a similar depth; the same guide plates were used as in the previous example. A stylus with a narrow point is more easily guided, and two cuts, each 5 thou. in. in depth, were taken. When cutting away the background, a stylus of larger diameter is used and the cutter is moved free-hand in a series of small circles. To obtain a symmetrical outline for the background a temporary guide frame can easily be rigged by clamping metal or wooden strips to the tracing table or screwing them down to the wooden carrier.

The background in the example illustrated looks rather irregular, but this appearance is exaggerated by the cross-lighting employed when taking the photograph at twice full size. Actually, the work has a good appearance and, in any case, the background is usually finished by painting to increase the contrast.

**The Wax Filling**

The wax filler used in the work samples illustrated is a proprietary preparation, supplied in various colours by Messrs. Taylor, Taylor & Hobson under the name Kwikfyl, and full instructions for its application are issued by the makers.

Briefly, the work is first warmed, and the wax is then rubbed into the engraving. When quite cold, the surplus wax is removed by rubbing with a cotton cloth. Although this is the correct method of dealing with highly-polished surfaces, we have found that unpolished metal and plastics can quickly be given a good finish by rubbing lightly with a strip of fine abrasive cloth moistened with a few drops of cutting oil.

## Next Week . . .

**TRACTION ENGINES**
W. J. Hughes, continues his description of the 1½ in. scale "Allchin" engine, and gives details of the methods of building the wheels.

**THE "BUMBLE BEE"**
The next instalment of the series on the construction of this small industrial petrol engine will describe the machining of the crankcase and main bearing housings.

**KEYWAY CUTTING**
"Duplex" describes a special tool for cutting internal keyways, for use in either the lathe or shaping machine.

**INDUSTRIAL PROGRESS**
An impression of the Birmingham Section of the British Industries Fair, with descriptions by our own reporter of some of the interesting exhibits.

**LOCOMOTIVE TOPICS**
"L.B.S.C." comes in dead on schedule with another of his ever-popular Lobby Chats.

**THE ANDOVER RALLY**
An eye-witness account, with photographs, of a memorable gathering of traction engines and their devotees.

# L.B.S.C.'s Titfield Thunderbolt

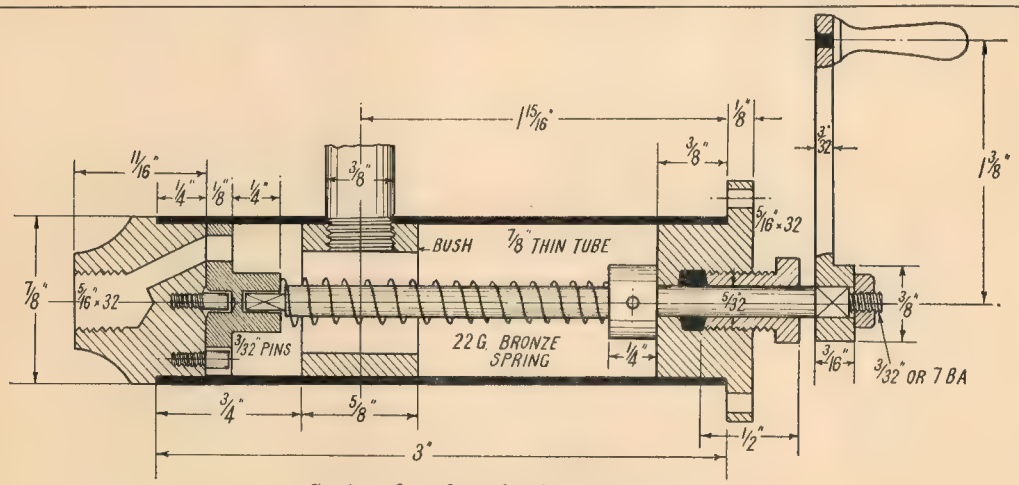
## REGULATOR FOR 5-INCH GAUGE ENGINE

THE regulator for the larger *Tit* is of the same pattern as that for the smaller one; and as it is made in exactly the same way, the instructions given in the previous instalment can be followed, merely altering the dimensions of the parts, to comply with the reproduced drawing. The barrel is made from $\frac{7}{8}$-in. thin tube, copper or brass, the bush being turned from $\frac{7}{8}$-in. rod, and drilled $\frac{1}{2}$ in. The throttle block is made from $\frac{7}{8}$-in. round bronze or gunmetal rod, or from a casting; likewise the valve. The steam ports are drilled with No. 32 drill; and after drilling, slightly nick the right-hand one with a small file or chisel, on the portface, to give a small "lead" when the regulator is first opened. This will enable the driver to prevent any slipping when the rails are damp or greasy. The pivot and stop pins are made from 3/32-in. bronze rod; rustless steel would also do, but be sure that it *is* rustless !

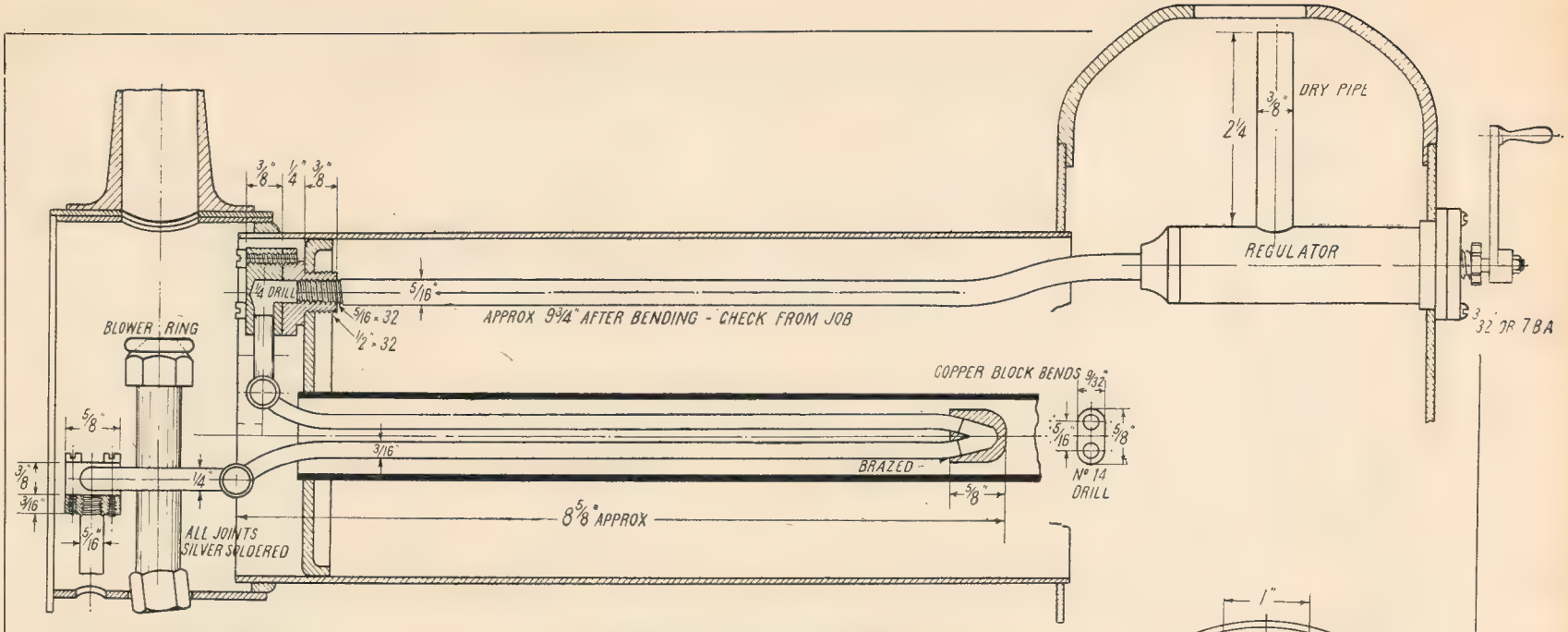
The flanged fitting which fits into the handle end, can be made either from a casting, or from $1\frac{1}{4}$-in. round rod; bronze or gunmetal for preference, but brass would do, as there is nothing to wear. I prefer castings for these larger flanged jobs, as there is less waste of metal, ye ken; but the gland can be turned from $\frac{7}{16}$-in. rod, and bronze would be best here, as the gland forms the main bearing for the regulator spindle. Ream the hole 5/32 in. Either hexagon or round rod may be used ; if the latter, slot the flange for C-spanner operation. The spindle should be made from 5/32-in. round rod; rustless steel, or bronze (either phosphor or nickel) are both suitable. The collar is turned from $\frac{3}{8}$-in. round rod, and drilled No. 23.

The whole bag of tricks can be assembled as described for the smaller edition, the end-play of the spindle, after assembly, being about 1/32 in. as before. The handle is filed or milled from 3/32-in. × $\frac{3}{8}$-in. steel, with a brazed-on boss turned from $\frac{3}{8}$-in. rod; the grip is turned from $\frac{3}{16}$-in. rod, with a 3/32-in. pip fitting into a countersunk hole in the handle. The hole through the boss should be $\frac{1}{8}$ in. square The main steam pipe is a piece of $\frac{5}{16}$-in. copper tube not less than 20-gauge, and approximately $9\frac{3}{4}$ in. long after bending, as shown. Both ends are screwed $\frac{5}{16}$ in. × 32 (or 40 if you prefer fine threads; I do) and the bent end is screwed into the throttle block with a smear of plumber's jointing on the threads. By the way, I have received a few letters from readers in rather remote spots in the country, saying that they can't get small quantities of plumbers' jointing locally, and engineers' stores and large ironmongers in the big towns, only supply cans big enough to do the pipe joints on a full-sized locomotive. Can I recommend a substitute ? Certainly; mix a little powdered red lead to a stiff paste with gold-size or boiled oil. This does the trick, but it sets like glue, and should the joints need taking apart at any future time, boy-oh-boy—*do* they stick !

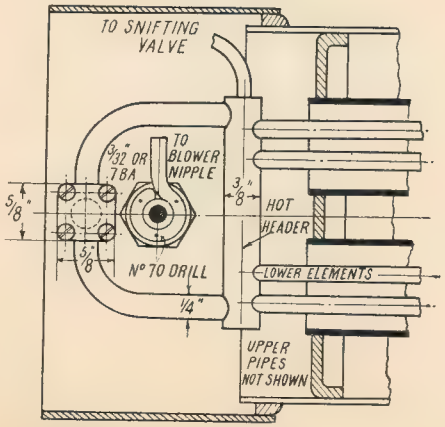
The steam flange which fits into the hole in the smokebox tubeplate, can be turned from 1-in. round or hexagon rod, brass being all right here, as there is nothing to wear; or from a casting. The boss is turned $\frac{1}{2}$ in. diameter for $\frac{3}{8}$ in. length, and screwed $\frac{1}{2}$ in. × 32, and drilled through with letter "J" or 9/32-in. drill, and tapped $\frac{5}{16}$ in. × 32. Note: If 40-pitch is used on the steam pipe, then 40-pitch must be used on both external and internal threads on the fitting, and the hole in the smokebox tubeplate. It may seem superfluous to call any attention



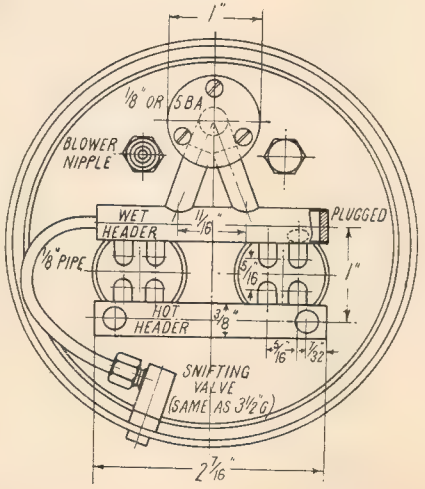

*Section of regulator for the 5-in. gauge engine*




*Arrangement of superheater and regulator for the 5-in. gauge engine*

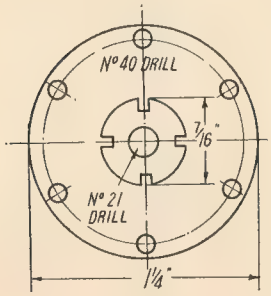



*Left: Part plan of superheater connections*




*Right: Tubeplate view of superheater connections*

to something which is obvious; but many of our readers would be surprised to know that beginners have used different pitches on the inside and outside, saying they hadn't got a die and tap with fine-pitch threads in the larger size—and then wondered why the flange wouldn't screw home! Tip—if




*Regulator flange*

round rod is used for the flange, be careful how you grip it for screwing home; I use a small pipe-grip with offset jaws, gripping well clear of the faced surface. If I happen to have a bit of hexagon rod of suitable diameter for the required flange, I use it, as the flange can then be screwed home with a spanner. Cast flanges could be made hexagon-edged with advantage. The dry pipe is a 2⅜-in. length of ⅜-in. copper tube, screwed into the bush in the regulator barrel, through the hole in the top of the "haystack," after the regulator is erected.

**Superheater**

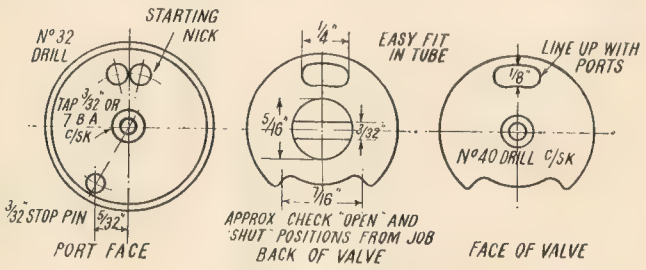
The superheater is virtually a duplicated edition of the one specified for the 3½-in. gauge engine, with the ends of the elements all connected by headers made from tube. The four elements, and the four block bends, are made up in precisely the same manner as described for the smaller locomotive, tubes and bends being the same size, but to the overall length shown in the section. Both headers are made from pieces of ⅜-in. copper tube, same as used for the boiler tubes; probably, suitable bits will be found among the offcuts. Square off in the lathe to a length of 2 7/16 in., clean the ends, and drive in little plugs, either slices parted off a piece of rod turned to a very tight fit, or discs of 16-gauge copper. The holes for the elements are drilled No. 14, the outer holes being 5/16 in. from the ends, and the inner ones at 5/16 in. centres; "mike" measurements not needed! On top of the wet header (you can see which is the top, from the sectional illustration) drill two holes for the connecting pipes from the flange, at 11/16 in. centres. Use letter "C" drill if available; failing that, 15/64 in. In front of the hot header, drill two similar holes at 7/32 in. from each end. In one end of the wet header, drill a No. 32 hole for the ⅛-in. pipe leading to the snifting-valve.

The connecting flange can either be a casting, or a ⅜-in. slice parted off a piece of 1 in. round or hexagon rod, faced, drilled for steam pipes, and for screws, to sizes shown. The two short connecting pipes are ¾ in. long and ¼ in. diameter, entering the wet header at an angle. Two short right-angle bends take the place of the "earwig's pliers" specified for the smaller engine. These are made from ¼-in. copper tube, and are fitted to the ends of the hot header, as shown in the plan drawing. No union is used in this size; we will use one of the flanged joints so dear to the hearts of the old-time designers who sported top-hats and side whiskers. This is a block of gunmetal or bronze ⅜ in. square, and a full ⅜ in. thick after facing off; this is another instance where a casting would do the needful. Drill a letter "C," or 15/64-in. hole clean through the thickness; and in the middle of one side, drill a similar hole, breaking into the cross-hole. The four corner screwholes are drilled No. 40.

**Assembly**

To assemble, first fit the elements into the block bends and braze the joints, using brass wire, or Sif-bronze, as jointing medium. This will flow easily if the whole lot is heated to bright red. Then after pickling and washing off, the elements can be attached to the headers, the flange and short pipes connected, and the bends and square flange attached to the bottom header. Everything is shown clearly in the drawings reproduced. A piece of ⅛-in. pipe about 5 in. long, is fitted to the hole in the end of the wet header. Anoint all the joints with wet flux, and silver-solder the whole issue at one heat. I prefer using coarse-grade silver-solder for a job like this; Johnson-Matthey's B6 is the cat's whiskers. However, for those who have had little experience of silver-soldering, as far as pipework is concerned, Easyflo or best-grade silver-solder may be used, as it will need a lower temperature. Make quite certain that the silver-solder has flowed around every joint; then let cool to black, quench out in the acid pickle, leaving it in about ten minutes or so, and then wash thoroughly in running water, letting the water run through the elements, to clear out any scale and dirt from the inside of the pipes. Erect as described for the smaller engine, using three ⅛-in. or 5-B.A. screws to attach the flange to the steam-pipe fitting.

The snifting-valve is exactly the same as specified for the 3½-in. gauge job, and is erected in the same way, as will be seen by taking a look at the front view; so we needn't waste any time and space over that little job. Note: I have shown the blower nozzle and ring, the blastpipe, and the connection to cylinders, in the drawings for both sizes of *Tit*, just for the sake of convenience; you don't have to bother about these, until the boiler is ready for erection. The next stage of the proceedings will be the comical old spring-balance safety-valves, and the boiler fittings, and all being well, I'll deal with these together, for both engines.




*Regulator portface and valve*

**Variations for other Locomotives**

Since the notes on the *Titfield Thunderbolt* have been running, I have received from time to time, queries from various followers of these notes, about the possibility of

using the design as a basis for building other types of locomotives of contemporary vintage. These have been dealt with privately; but as many readers seem tickled with the idea of building a small copy of some relic of bygone days, which will put up a modern performance, maybe if I squeeze in a few brief remarks on the subject, they won't come amiss. First, the "works" of the *Tit*, either loose eccentric or gab motion, can be adapted to practically any six-wheeled engine with inside cylinders, whether 2-4-0, 0-6-0, or single-wheeler. If the wheelbase is longer, merely lengthen the connecting and eccentric-rods to suit. If the leading axle gets in the way, either raise or lower the cylinder centre-line, so that the guide bars and other blobs and gadgets will clear. As long as the centre-line of cylinders passes through the centre of the driving axle, you've nothing to worry about. Many of the old 0-6-0 engines with wheels around 4 ft. 6 in. to 5 ft. diameter, had a wheelbase which was so near to that of the *Tit*, that the latter's coupled wheelbase could be used, and the trailing wheel of the 0-6-0 arranged at suitable distance behind it. In such cases, the *Tit* cylinders and motion could be used lock-stock-and-barrel, built and fitted up as per the given instructions. As the cranks outside the wheels were of abnormal throw for the period, I would suggest that the cranks of any 0-6-0 or 2-4-0 be made to the same throw as the crankshaft, or at least corresponding proportionately to the full-sized job.

**The Boiler**

This would be suitable, with slight alteration, not only for any of the engines mentioned above, but for wee editions of the Stephenson long-boiler type. The length of barrel doesn't matter, within reason, for the given dimensions of firebox. Slight variations in diameter of the barrel, need not entail any alteration in the arrangement of tubes and superheater. One tip I might offer about a long-boiler locomotive, viz.: "split the difference," in a manner of speaking, between the length of the boiler-barrel of the proposed engine, and the boilers I have described; and set the tubeplate of the lengthy merchant, back into the boiler barrel, a distance which will correspond. This not only reduces excessive tube length, but allows of much greater smokebox volume. Much of the steaming and fire-throwing trouble of the old-time locomotives, was due to the very short smokeboxes, sometimes not any longer than the diameter of the chimney base. I have found that in small practice, the big smokebox is just as advantageous as in full size, for evening up the effects of a sharp blast, and getting a better pull on the fire. With the tubeplate recessed well into the barrel, you get the volume required, plenty of room for the superheater headers and connections, and no complaints from Inspector Meticulous and his friends and relations, about the outside appearance being "all wrong."

If the locomotive being copied hasn't the "haystack" or Gothic dome, just make a round-backed wrapper, in one piece, bent to the shape of an arch, and attach it to the barrel by a ring, in the same way that I described for the *Tit* smokebox wrappers. This can be furnished with a backhead of the usual pattern. The firebox would be the same as with the "haystack" wrapper, but with the usual girder stays on top. The same regulator, and the fittings to be described, could all be utilised. If all goes well, and our friend with the blue pencil raises no objection, the old-timer to follow the *Tit* will be a quick description of a locomotive, of which type only two were built, viz.: *Ajax* and *Mars*. They were single-wheelers with 10 ft. driving wheels made from boiler plates, and were absolute and complete washouts, with hardly the power to pull their own tenders. Well, we'll see what sort of a show they will put up with Curly boilers and "works," and I have a hunch that a few more fallacies are going to be blown sky-high—nuff sed !

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# Who's Who IN MODEL ENGINEERING

**FRED SMITH**

Besides being a prolific builder of models himself, Mr. Fred Smith is well known as a worker in the cause of model engineering generally, and has been responsible for organising many activities in his locality.

He was born at Langton Colliery, Pinxton, in 1885, and educated at Pinxton Elementary School and later at Brunts Technical School, Mansfield. He has had unique opportunities for studying the type of engineering equipment employed in collieries, having been Chief Colliery Technician at Langton Colliery. He first became interested in model engineering 55 years ago, and has been a constant reader of "The Model Engineer" from No. 12 issue. Many of the models constructed by Mr. Smith have attained distinctions at "The Model Engineer" Exhibition and other exhibitions. They include a colliery winding engine of 1821, a hauling engine of 1856, and a double cylinder table engine of 1826; also a 500-watt 4-pole "M.E." dynamo, a horizontal engine of 1859, fitted with Watt's parallel motion, and a horse-drawn colliery winding gear. For many years he has been the secretary of Pinxton Model Engineering Society, and a member of the Nottingham Society of Model Engineers. In addition to model engineering, he finds time to cultivate a large garden and orchard, also for wood turning and making children's toys. He collects old photographs or other information on the history of engineering, and is also keen on measuring up engines he encounters, and keeping records and making drawings of all important details.

# QUERIES AND REPLIES

**"THE M.E." FREE ADVICE SERVICE.** Queries from readers on matters connected with model engineering are replied to by post as promptly as possible. If considered of general interest the query and reply may also be published on this page. The following rules must, however, be complied with:

(1) Queries must be of a practical nature on subjects within the scope of this journal.
(2) Only queries which admit of a reasonably brief reply can be dealt with.
(3) Queries should not be sent under the same cover as any other communication.
(4) Queries involving the buying, selling, or valuation of models or equipment, or hypothetical queries such as examination questions, cannot be answered.
(5) A stamped addressed envelope must accompany each query.
(6) Envelopes must be marked "Query" and be addressed to THE MODEL ENGINEER, 19-20, Noel Street, London, W.1.

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**Material for Fishing-rods**

*I should be grateful for advice on the following questions: (a) Could you tell me of any firm which would supply poles of Tonkin or other suitable bamboo for splitting to build a fishing-rod?*

*(b) Could you tell me how the grey bronze finish usual for reels, ferrules and other brasswork on a rod can be achieved?*

P.C.N. (Newcastle-on-Tyne).

(*a*) The following firms are importers of bamboo and may be able to assist you in obtaining a suitable grade of material for your purpose:

A. E. Davies & Co. Ltd., 164, Lever Street, London, E.C.1.

M. Jacobs Young & Co. Ltd., 263, Borough High Street, London, S.E.1.

F. Westbury & Son Ltd., 235, King's Avenue, Clapham Park, S.W.12.

Woods Sons & Co., 6, Milk Street, London, E.C.2.

(*b*) Chemical finishes for various metals can be obtained from Messrs., W. Canning & Co. Ltd., St. John's Street, Clerkenwell, London, E.C.1.

**Converting Refrigerator Compressor**

*I have recently purchased a second-hand refrigerator unit, including a ¼ h.p. motor and compressor, with the idea of converting it for use as a spray painting plant. I find, however, that the compressor, which is of the 2-piston type, is allowing oil from the crankcase to pass into the cylinder, so that it eventually gets into the air line to the spray gun.*

*There appears to be some wear in the bores, and there are no piston rings, but there is a groove cut round each of the pistons about half-way up. I find that the oil still collects on the top of the pistons even with the cylinder-head removed, so it does not appear that the oil is being drawn up by suction.*

L.A.L. (London,N.8.).

Most refrigerator compressors of this type are designed so that the air or gas passes through the crankcase, and, therefore, it is very liable to pick up a certain amount of oil which has been splashed about inside this space.

It is extremely doubtful whether the oiling trouble could be cured by the use of piston rings or scraper rings, but it might be possible to modify the compressor so that air is taken directly into the cylinders instead of through the crankcase.

We could not advise you definitely on this matter, however, without exact details of the design of the machine.

Another possible alternative remedy would be to fit an oil separator in the delivery pipe of the compressor, but our experience is that a very elaborate separator would be necessary to ensure sufficiently clean air for paint spraying purposes.

**Small Electric Motor**

*I require a small electric motor for very light duty to work from a "grid bias" battery. I have made a tripolar armature with 30 turns of the wire on each pole, and would be grateful if you will tell me how many turns of wire I shall have to wind on the field, to enable me to make the motor turn on 9 volts from a battery of this type.*

H.J.R. (Birkenhead).

We do not understand exactly why you must use a "grid bias" battery, which is specially designed to produce a specified voltage at a very small current output, and is of a type basically unsuited for driving a motor. A battery capable of higher amperage output would be much more satisfactory, even if of lower voltage.

The particular design of a motor intended to run on such a battery must be regarded as mainly experimental, and in the circumstances, we cannot give you definite advice as to the windings. We suggest, however, that you could obtain a good deal of really sound advice on small electric motor design for various voltages and current consumption from our handbook *Small Electric Motor Construction*, by J. Gordon Hall, price 5s. 0d.

**Special Magnets**

*I require some small magnets of a special type, and up to the present, have been unable to obtain anything of a suitable nature. I am informed by a friend that you would know where such magnets could be obtained. I may mention that I am a member of the Magic Circle, and find small magnets of great assistance in many pieces of apparatus.*

C.L.C. (Harrow).

We do not know of any magnets exactly like the one you enclosed which can be obtained from stock, but we give herewith the names of several manufacturers who may be able to supply you with something which will suit your purposes.

James Neill & Co. (Sheffield) Ltd., Composite Steel Works, Napier Street, Sheffield, 1.

Swift Levick & Sons Ltd., Clarence Steel Works, Leveson Street, Sheffield, 4.

William Jessop & Sons Ltd., Brightside Works, P.O. Box 94, Sheffield, 1.

Edgar Allen & Co. Ltd., Imperial Steel Works, Sheffield.

Thos. Firth & John Brown Ltd., Atlas & Norfolk Works, Sheffield.

**Controlling Small Electric Motors**

*Please can you give me advice on the best method of controlling a small electric motor as fitted to a boat? Is it desirable to use a variable resistance in the circuit to cut down the amount of current to the motor when required, or would it be better to arrange a switch to control the number of cells used in the battery? The latter would apparently have the disadvantage that it would not use all cells equally, but in other respects, it would appear to be the more efficient as a means of control.*

C.J.L. (London, E.12).

The use of any form of resistance in series with a motor must necessarily result in waste, and whatever type of resistance is employed, all current over and above that which would normally be consumed by the motor is dispersed in heat.

The idea of using a selector switch to control the number of cells in the battery which are connected to the

motor is a much more satisfactory one, and one way of controlling, to some extent, the amount of current consumed by the various cells would be to arrange the selector switch so that it could be completely reversed to work from the other end of the battery. If the motor is of the permanent-magnet type, care must be taken to see that the actual polarity at the motor terminals remains the same.

**Hot-air Engines**

*I am interested in the construction of model hot-air engines, and should be grateful if you could give me some information on this subject. I understand that it is possible to obtain plans for the construction of a* 1/20 *h.p. hot-air engine* (*Heinrici type*) *and should like to know the price of these.*

J.E. (Arizona, U.S.A.).

Several examples of model hot-air engines have been described in THE MODEL ENGINEER within the last year or two. The following would probably be found helpful:—

*A Spirit-fired Hot-air Engine* in the February 22nd and March 1st, 1951 issues.

*How to Make a Small Hot-air Engine* in the November 23rd, 1950 issue.

*A Four-cylinder Hot-air Engine* in the December 14th, 1950 issue.

Drawings of the 1/20 h.p. Heinrici type hot-air engine can be obtained from our Publishing Department in a set of two sheets, price 2s. 9d. per sheet.

**Transparent Plastic Tubing**

*I am anxious to obtain a piece of transparent plastic tube, say* $1\frac{1}{2}$ *in. to* 2 *in. inside diameter,* 9 *in. long and* $\frac{1}{8}$ *in to* $\frac{1}{4}$ *in. in thickness, for an oil container to feed a Heywood compressor. Can you please tell me where I could obtain this?*

R.H.B. (Newent).

We suggest that Catalin would be suitable for your purpose, and this is obtainable from Messrs. Catalin Ltd., 54, Farm Hill Road, Waltham Abbey, Essex.

Perspex is also a suitable material, and this is manufactured by Imperial Chemical Industries Ltd., Plastics Division, Welwyn Garden City, Herts.

We cannot say definitely whether these firms are prepared to supply small quantities direct, but they will probably advise you where retail supplies are available.

# R.Y "Britannia" and the "M.E."

MANY of our readers will have noticed in the photographs of the Royal apartments in the *Britannia*, which were published in the newspapers on the return of the Royal Party from their world tour, the fine model of H.M.S. *Magpie* which, from its position in a recess at the end of the Duke of Edinburgh's sitting room, at once caught the eye. It was even more conspicuous in the room than appears from the photographs, as the recess in which it was housed was illuminated from above by concealed lighting. This is the model which was presented to His Royal Highness when he opened the "M.E." Exhibition two years ago. At the Exhibition we were impressed with the keen interest he took in models and especially in ship models, and as a further proof we have the fact that he has presented a cup to be competed for annually at our "M.E." Exhibition.

It is obvious that the Duke appreciated the gift of a model of his old ship from the fact that it has been installed in his room on the *Britannia*. A special recess with a glass front was built to receive the model, so that it is completely protected from dust and damage. The model was taken out of its glass case and, with its baseboard and painted "sea," inserted into the recess, in which it fits exactly. The idea of the model was first suggested to Percival Marshall & Co., Ltd., by Mr. A. D. Trollope of the Imperial War Museum, as a gesture from the ship modellers of the country. To make it more representative, the work was divided amongst a team of craftsmen from various parts of the country. The members of the team were Mr. A. D. Trollope, Mr. J. B. Glossop and Mr. M. Morwood, all of the Imperial War Museum, Mr. A. S. Abblett, of Ruislip, Mr. R. A. Chapman of Buckhurst Hill, Mr. G. H. Draper, of Ilford, Mr. A. E. Field, of Walsall, Mr. W. H. Honey, of Tulse Hill, S.W.2, Mr. F. A. A. Pariser, of Castle Bromwich and Mr. N. M. Peters of Wallington. It may be mentioned that most of the team have won cups or medals at previous "M.E." exhibitions. The resulting model was a beautiful piece of work and the quality throughout was of a consistently high standard. We consider it a great compliment that the model has been housed in such a prominent and appropriate position.

# READERS' LETTERS

**Letters of general interest on all subjects relating to model engineering are welcomed. A nom-de-plume may be used, but the name and address of the sender must accompany the letter. The Manager Editor does not accept responsibility for the views expressed by correspondents.**

### A HOME-MADE WELDING PLANT

DEAR SIR,—I have constructed an electric arc welder, using a ex-government 200-amp, 30-volt generator, driven from the power take-off of a Ferguson farm tractor. All the small parts of shafts and collars were machined on a M.L.7 lathe which I have in my farm workshop, also several other home-constructed machine tools.

I hope this will be of interest to other readers, as I can remember a letter in the correspondence page early last year, and have heard of others who have tried to construct welders from the same type of generator. The photograph shows the machine at work, using a No. 8 welding-rod.

I am at the moment constructing an electrically-driven tool grinder, using a ½ h.p. motor and two 9 in. diameter wheels, driven by V-belts and fitted up to an angle steel frame of welded construction.

Yours faithfully,

Angus. JAMES M. BRUCE.

### THAT LATIN PHRASE

DEAR SIR,—Re M. Lawson Finch's letter in your issue dated April 29th, 1954. Some years ago, through the good offices of John Wilder & Son of Wallingford and one member of their staff, I obtained a similar plate to that mentioned by Mr. Lawson Finch to add to my small collection and making numerous enquiries, I eventually came by the following information: *Astra Castra Numen Lumen*, literally means, "The Stars my Camp, God my Lamp."

The word *Numen* has been found by a friend in a Roman Catholic prayer book and is an ancient Latin word meaning "God," I suppose before the use of the word Deity or Deius. Now the reason for finding these words and crest on the Wantage traction engines.

The late Mr. F. J. Bretherton who was definitely an authority on road locomotives told me that about the year 1900 the Wantage Eng. Co. were financially embarrassed and were financed by the then Lady Wantage, and the crest which surmounts the Eng. Co. ring is the crest of the Wantage family.

It will be very interesting to see if you receive similar information or I may have to revise my explanation of this most interesting ring.

May I say how pleased I am to know others take an interest in these makers' plates, they all tell a tale.

My small collection consists of A. & P. "Invicta" right hand—I have not been fortunate enough to find a left-hand one. (By the way, the Wantage ring weighs 12 lb.) A Foster plate with a 1914-18 tank at the bottom, now I want one without the tank, dating before 1914. One large and one small Bull plate given by John Allen & Son, Cowley, and a Britannia plate of Marshall Sons & Co. My collection has not grown much during the last few years, as we moved to Kent and two years after returned to Oxford.

I hope the information I have given you will prove correct, I am not a Latin scholar.

Yours faithfully,

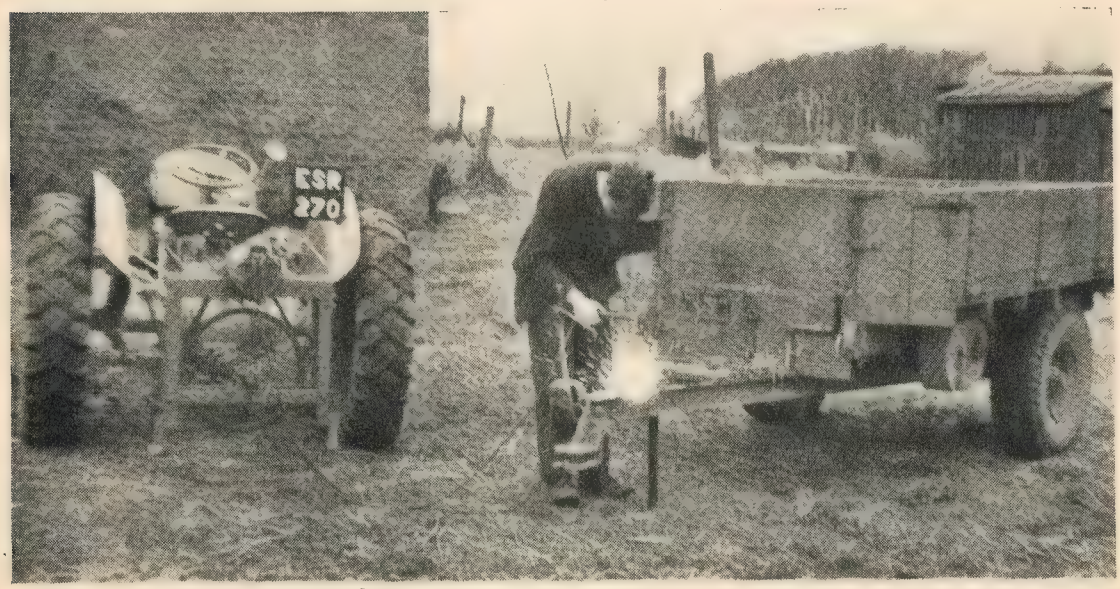
Oxford. GERALD EASTES.

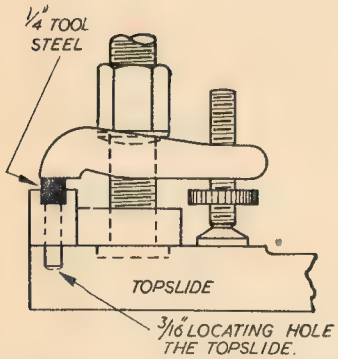
### A TOOL HOLDER FOR PLANING

DEAR SIR,—Here is a little gadget I designed for use in my M.L.7 lathe in which, perhaps other readers may be interested. I have found that when using this tool-holder for planing in the lathe, the tool is as steady as the proverbial rock.

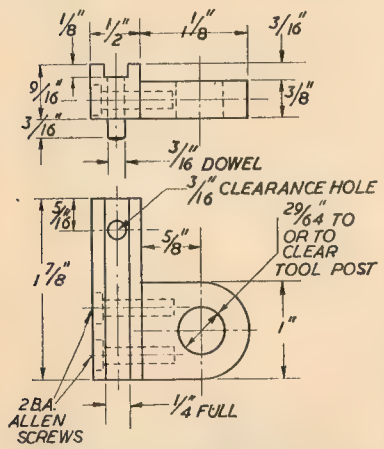
As can be seen from the sketches, the gadget fits over the toolpost, after removing the spring, and the $\frac{3}{16}$ in. dowel fits into a hole drilled in the cross-slide; this hole is blind, and is $\frac{3}{16}$ in. deep. There is plenty of metal to allow for this on the M.L.7.

My tool holder was designed for $\frac{1}{4}$-in. tool steel. The whole job was made of mild-steel section, one






piece $1\frac{1}{8}$ in. × 1 in. × $\frac{3}{8}$ in. and one piece $\frac{9}{16}$ in. × $\frac{1}{2}$ in. × $1\frac{7}{8}$ in. The slot to take the tool was milled out under the tool clamp with a $\frac{1}{4}$ in. end-mill in the 3-jaw chuck; a little careful fitting, and joining together with two 2-B.A. Allen screws, holds the job quite firmly.




It is best to use Allen screws or slotted screws with sunk heads, and then there is no fear of the heads fouling the chuck jaws. This little holder could, of course, be made for larger tools and could be adapted to suit lathes of various centre heights; the whole job could be made from the solid if desired.

As an alternative to drilling the top-slide, the body which takes the tool could be made $2\frac{3}{4}$ in. long and the dowel fitted at the rear. Careful filing of the dowel would allow the holder to be used at right-angles to the job and still be rigid.

I have at various times found some very good hints and tips in THE MODEL ENGINEER, having been a reader for just over seven years, so carry on the good work. From a satisfied reader.

Yours faithfully,

Birkenhead. H. J. ROBERTS.

# WITH THE CLUBS

### York City and District Society of Model Engineers

The following fixtures during the coming weeks have been arranged :—

June 13th. Locomotive running from 2.30 on, at the track, at Bishopthorpe.

June 16th, 17th and 19th. Preparation for 20th. 6.30 p.m.

June 20th. Society's track is open to the public from 3 p.m. to 8.30 p.m., admission 6d.

June 27th. Open day for visitors and societies, from 2 p.m.

July 3rd. Meeting at Rechabite Building, 7 p.m.

Hon. Secretary: W. SHEARMAN, 28, Terry Street, York.

### Wood Green & Dist. M.P.B.C.

After a winter in dry dock, owing to repairs to the pond, at White Hart Lane Recreation Ground, we are once again able to operate, and extend a hearty welcome to any who may like to join us. And a cordial invitation to friends who may care to visit us. We are to be found round the pond side each Sunday morning.

Further particulars can be obtained from the Hon. Secretary: A. F. MILES, 5, Courey Road, Hornsey, N.8.

### Tees-side S.M.E.E.

At a meeting held in Middlesbrough recently, a talk was given by Mr. V. Byrne on "Problems met with in the Workshop." He described some of his own early experiences as an apprentice and later as journeyman, and gave details of some really tough jobs which had to be tackled, with only a hammer and chisel, files and scraper, some to fine limits, such as is usually associated with machine tools. In those days, if a job would not go in the lathe, then the lathe was altered.

Hon. Secretary: J. W. CARTER, 28, East Avenue, Billingham, Co. Durham.

### Ashford & East Kent M.E.S.

At the recent annual general meeting the following officers were elected to serve for the year 1954-5 :—

President: Dr. B. Roberts. Vice-presidents: A. Chester Beatty and F. G. Norman. Chairman: J. Hanson. Hon. sec.: C. B. Butcher. Hon. treas.: W. Tomsett.

Hon. Secretary: C. B. BUTCHER, 63, Hythe Road, Ashford, Kent.

### The Northern Association of Model Engineers

At our meeting on May 1st, we welcomed three additional clubs into the association. One was the well established Blackpool S.M.E., and the other two are newly formed clubs in the Manchester district, the Hazel Grove M.E.S., and the Middleton & District S.M.E.

A visit has been arranged for July 2nd, to the steelworks of Messrs. John Summers & Co. Ltd., of Shotton, and further visits are in hand for later in the year.

Hon. Secretary: J. H. S. WILLIAMS, 154, Park Road, Timperley, Cheshire.

### Port Talbot, Neath and District S.M.E.

There was a very good attendance at the sixth annual general meeting of the above society, held recently. We have purchased a second-hand 5 in. Drummond lathe, grinder and other various tools for the workshop, which is now being fitted out.

The following were appointed officers for 1954-55: Chairman, Mr. J. Thomas; vice chairman, Mr. E. J. Williams; treasurer, Mr. D. H. Jennings; secretary, Mr. D. Elwyn Evans.

Hon. Secretary: MR. D. ELWYN EVANS, "Bronelwyn," 6, Beechwood Avenue, Neath, Glam. Phone 726.

### West Hants Aeromodellers Association

The West Hants Radio-controlled Glider contest will be held on Sunday July 4th, commencing at 12 noon, at Larkhill, near Amesbury, Wiltshire. The site is only a few miles from Stonehenge and forms part of the Royal Artillery School of Gunnery firing ranges. The flying ground is situated in the "blank" area over which firing takes place; there is absolutely no danger from any form of unexploded missiles although, naturally, the W.H.A.A. are not responsible for any injury to any contestant, spectator or others however received.

The site is situated on high ground, noted for its thermal currents, retrieving is possible for a distance of approximately five miles in all directions, with the minimum of obstructions.

Any further information required may be obtained by writing to either H. E. WHEATLEY, 5, Alum Chine Road, Westbourne, Bournemouth, or D. NAYLOR, Flat 2, 29, Cavendish Road, Bournemouth, (S.A.E. please), or by telephone between 8 a.m. and 9 a.m. or 11 p.m. and 12 p.m., the number being Bournemouth 2786.

### Weymouth & District M.E.S.

The society meet every Thursday in the metal-work shop of the Cromwell Road, Boys School, and is open to anyone to join above the age of 16 years.

There are the usual sections and work is going full steam on a 5-in. "Maid of Kent," every one interested doing their bit; also, there is the "OO" gauge section and these are busy building a 16 ft. by 11 ft. layout, which will be on show at the society exhibition in August.

If you are a model maker, why not visit us, or write to do the Secretary: MR. H. SWINDELL, 27, Leamington Road, Weymouth, Dorset.

### The Farnborough S.M.E.

Our 3rd Exhibition is to be staged as last year in the Town Hall, Farnborough and will be held on September 24th-26th. The "O" gauge group will have on show its fine new layout 25 ft. by 15 ft. and there will be several "OO" layouts on show. Trade stands and a steam passenger carrying track, also a workshop will be on show.

Work has now begun on track laying on the clubs "OO" layout and it is hoped members will turn up on Thursday evenings at the clubroom in St. Christophers Road, Cove, to help on both the 7 and 4 mm. scale layouts. New members are always welcome and full details can be obtained from the Hon. Secretary: D. L. JENKINS, 16, Hurst Road, Farnborough, Hants. Tel. 1911.

### Wallasey M.P.B.C.

The above club will hold their Annual Open Regatta at Central Park, Wallasey on Sunday June 20th. The starting time is 11 a.m.

Intending visitors are asked to notify the club secretary at their earliest convenience. The programme will be as follows :—

5 c.c. Hydroplanes
10 c.c. ,,
10 c.c. ,, Restricted Steering competition
15 c.c. Hydroplanes
30 c.c. ,,

Should time permit, a nomination race will be held.

Intending visitors are advised to bring their own food for lunch, light refreshments will be available at teatime. Tea will be served at both meal times.

Hon. Secretary: R. L. L. DON, 57, Wright Street, Wallasey.

*The Romford Model Engineering Society's new multi-gauge track. The photograph shows Mr. R. A. Riddles, former member of the Railway Executive driving Mr. Buckle's 3½-in. gauge "Britannia" on the inaugural train. Photograph by J. F. Bruton.*

### Guildford M.E.S.

The model engineering section of the Guildford Model Yacht, Power Boat and Engineering Society, is now a separate society, known as The Guildford Model Engineering Society, with headquarters at Hut 6, Woking Road, Guildford.

*Interests*: general engineering models, railways, live steam 2½-in., 3½-in. and 5-in. gauges, 4 mm. ("OO" gauge) and power boats.

We possess a small workshop equipped with lathe, drilling machine and hand tools; a 50-ft. live steam test track indoors; and 4 mm. layout under construction.

Meetings held at Hut 6, at 7.30 p.m. on Wednesdays, live steam; on Thursdays, 4 mm.

The above information cancels all previous data regarding the Model Engineering Section as previously comprised.

Hon Secretary: V. H. R. Selley, 42, Raymond Crescent, Dennisville, Guildford, Surrey.

### Stephenson Locomotive Society

Celebrating the forty-fifth anniversary of its foundation, the S.L.S., which caters for locomotive and railway enthusiasts aged 16 and upward, professional or amateur, held a dinner recently, in London. The Society's chairman, Mr. A. J. Boston, presided. In addition to ladies, the guests included railway officials and representatives of the technical Press to all of whom an appreciation of their helpfulness in so many ways in connection with the Society's many indoor and outdoor activities was expressed by the President, Mr. J. N. Maskelyne, A.I.Loco.E., in proposing the toast, "Ladies and Guests," a charming response being forthcoming from Mrs. Casserley, wife of the general secretary, who was the first lady speaker at an S.L.S. gathering. "British Railways," was proposed by Mr. P. J. Garland, F.C.A., and acknowledged by Mr. W. N. Roberts, District Passenger Manager, Euston, L.M.R., who assured the company present that his department's services knew no political bias and that a request for a special train or other accommodation would receive the same careful attention, whether under nationalised or independent auspices. The chairman, proposing "The Railway Press," stressed the importance of the legitimate and the accurate, paying tribute to the publications found regularly in the Society's library and read regularly by hundreds of members (in addition to its own regular monthly *Journal*). Mr. H. A. Vallance of the *Railway Magazine*, another of the principal guests which included Mr. Cyril Smith, chairman of the Railway Correspondence & Travel Society, replied mentioning how careful one had to be in accuracy of detail, as thousands of eagle eyes scanned every word and figure. Like the members, he too was a lifelong enthusiast. Mr. Hally Brown represented the Scottish centres and membership.

### Romford Model Engineering Club

On May 8th, in glorious weather, R. A. Riddles, C.B.E., M.I.Mech.E., performed the opening ceremony of the new multi-gauge continuous track built by members of the Romford Model Engineering Club. After an introduction by the chairman, Mr. L. R. Chilver, Mr. Riddles in his opening remarks referred to our live steam locomotives as not being models but the real thing in miniature, and unlike the full-size locomotive which was the result of the work of many experts, its miniature counterpart was very often designed and built by one individual, which he thought a great achievement.

Having cut the tape and declared the track open, he was invited to drive Mr. H. Buckle's 3½" gauge "Britannia" locomotive, which he did with obvious enjoyment. On completing three laps, Mr. Riddles was presented with a small silver replica of a full-sized fireman's shovel, suitably engraved, to commemorate the occasion.

A party of friends and visitors numbering nearly two hundred, including several neighbouring M.E. societies, enjoyed the ceremony and later rode round the track on trains pulled by locos of various gauges belonging to members of the club. A time-table had been prepared to provide for three locos running at the same time, with the object of showing as many locos in steam as possible and carrying all the passengers, who wished to view the whole circuit of the track, before teatime. By restricting each locomotive to a 20-minute run, this was successfully accomplished, making an interesting programme for spectators and passengers alike. No fewer than eleven locos performed this task without trouble.

The building of the track and the arrangements for the event reflected great credit on the team effort of those who had worked so hard,

## THE MODEL ENGINEER DIARY

**June 12th.—St. Albans & District M.E.S.** Invitation regatta. Free running boats only at Verulamium, St. Albans, Herts.

**June 13th.—Model Power Boat Association.** National Speed Regatta at Verulamium, St. Albans, Herts.

**June 14th to June 26th, 1954 inclusive—The Plymouth and District Society of Model and Experimental Engineers.** Exhibition at Pitt's Memorial Hall, Gibbon Street, Plymouth.

**June 20th.—Wallasey Model Power Boat and Yacht Club.** Regatta at Central Park, Wallasey. Commencing at 11 a.m.

**June 20th.—Model Power Boat Association.** Regatta for radio controlled boats at Victoria Park, Hackney, E.9.

**June 26th and 27th.—Birmingham Society of Model Engineers.** National Loco Rally at Campbell Green.

**June 27th.—Orpington Model Engineering Society.** Regatta at Victoria Park, Hackney, E.9.

**July 3rd.—Vickers-Armstrongs Ltd. (Weybridge) Model Club.** Annual exhibition, at V.A.B. Ltd., Sports Ground, Kings Head Lane, Byfleet, Surrey.

**July 10th and 11th.—International Radio Controlled Models Society.** Annual Contests for radio controlled models, to be held in Birmingham.—Model Boats on July 10th, and Model Aircraft on July 11th.

**August 18th, 19th, 20th, 21st, 23rd, 24th, 25th, 26th, 27th and 28th. The Model Engineer Exhibition** at the New Horticultural Hall, Greycoat Street, Westminster, S.W.1. Open from 11 a.m. to 9 p.m.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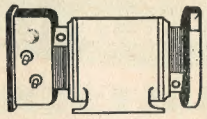

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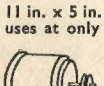

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